1952 Vol. LIII APRIL 22nd, 1948

FLIGHT

and

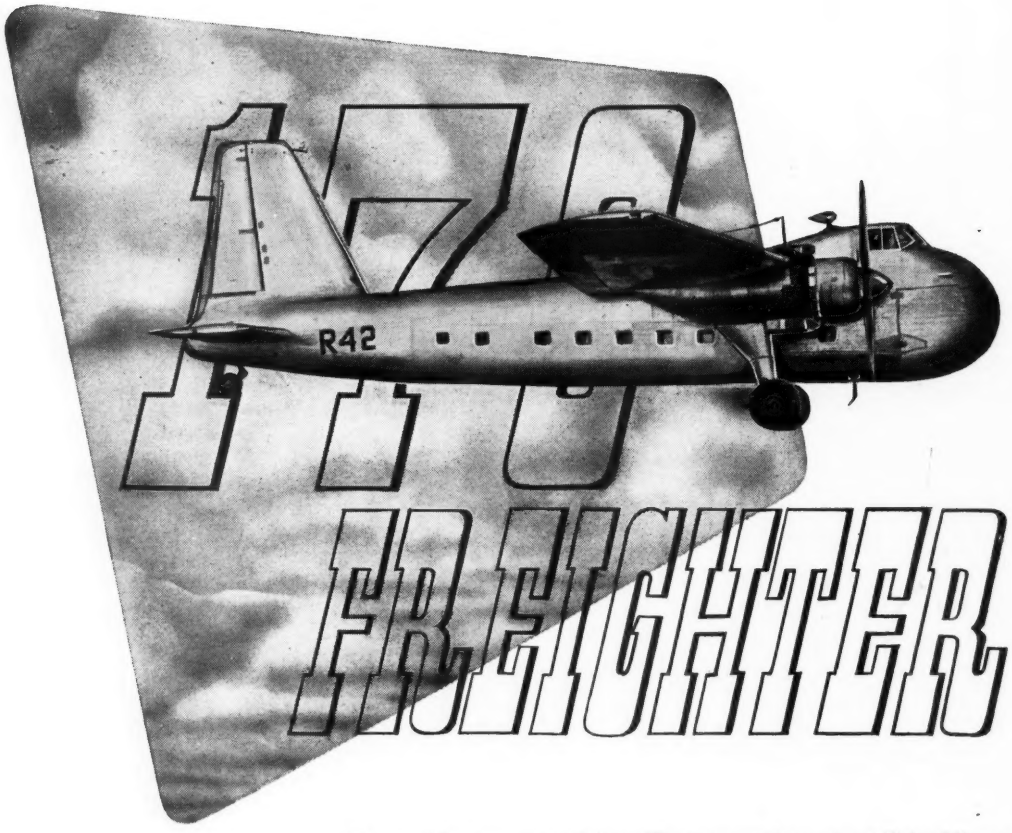
AIRCRAFT ENGINEER

THE LIBRARY OF CONGRESS
MAY 17 1948

OFFICIAL ORGAN OF THE ROYAL AERO CLUB ONE SHILLING

D E H A V I L L A N D D O V E

LIBRARY OF CONGRESS
AERONAUTICS DIVISION

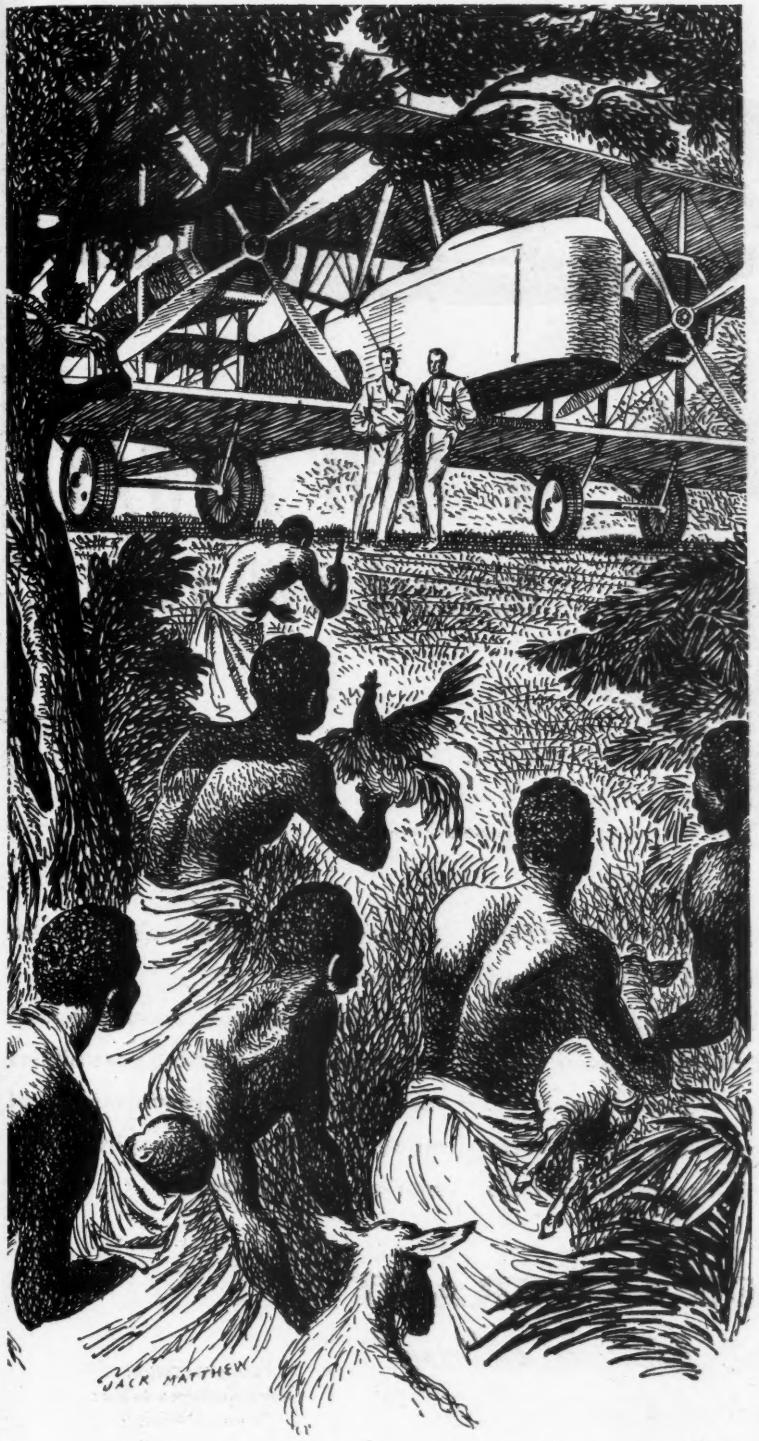


Powered by two 1,690 b.h.p. Hercules engines, the "Bristol" new Type 170 Freighter has a cruising speed of 162 m.p.h. and a range of 1,100 miles with a 4 ton pay load. Designed for economy in service and safety in operation this new heavy-duty aircraft is meeting the growing needs of commercial air transport. Well named "The Merchantman of the Air" this machine is a tribute to the skill and experience of those responsible for its production. B.I. Callender's Aircraft Cables for power, radio, lighting and H.T. ignition used in the "Bristol" 170 are also the result of technical skill and years of experience supplying aircraft with the best possible electric cable equipment.

B.I. Callender's

AIRCRAFT CABLES

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2



VICKERS-ARMSTRONGS

Makers of Aviation History

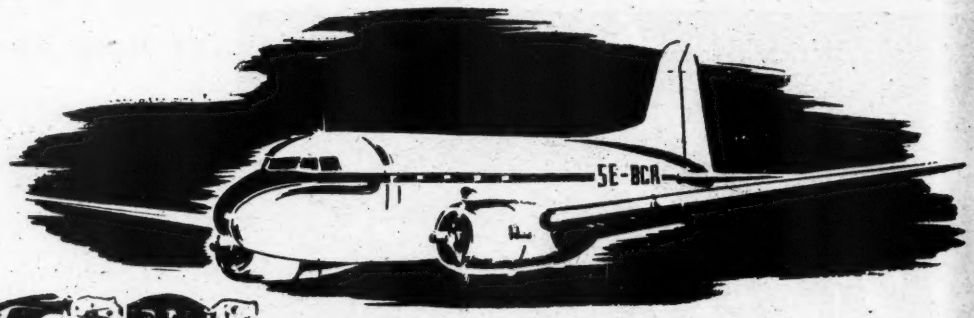
LETTE ZAWADI ILI TUPENDEZE NDEGE

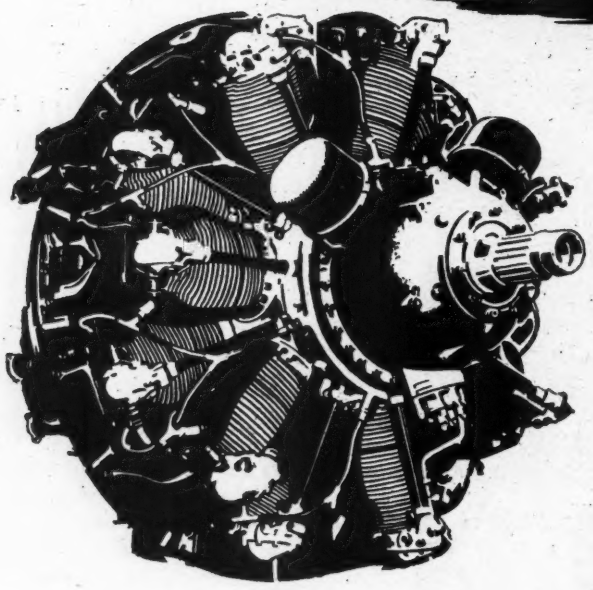
(Bring presents to please the bird)

Panic mingled with awe–such was the re-action of the Kavirondo natives when the first airplane they had ever seen–a Vickers Vimy–touched down on its way to the Cape. The year was 1920–the occasion was the first successful flight to South Africa. Emulating the spirit of Livingstone, Col. Van Ryneveld and Capt. Brand completed the 8,500 miles from Brooklands to Cape Town in 4 days 13½ hours of flying–an outstanding achievement of the time. The project was pushed through in the face of incredible risks:– such as the absence of prepared landing grounds–no precise knowledge of weather conditions on the route and total lack of facilities for repair and overhaul. The flight ranks high in the history of aviation. That a Vickers standard machine was chosen for the job demonstrates the leadership then enjoyed by the firm–a leadership consistently maintained to this day.

Vickers-Armstrongs Limited *Aircraft Section* VICKERS HOUSE, BROADWAY, LONDON, S.W.1

A.T.27





A NEW ENGINE

Designed to fill a need...

The new Pratt & Whitney R-2180 Twin Wasp engine was designed especially to fill the need for an engine in the 1650-horsepower class to power new transport aircraft. Already it has been selected for the SAAB-90 Scandia, a new 32-passenger twin-engined Swedish airliner.

In addition, this rugged, economical engine offers interesting possibilities for improving the performance of many existing twin-engined and four-engined aircraft.

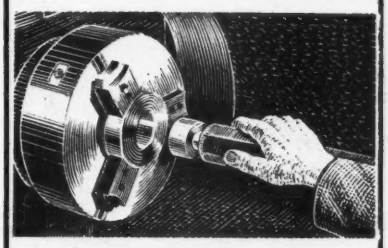
UNITED AIRCRAFT
Export Corporation
EAST HARTFORD, CONNECTICUT, U. S. A.

European Office:
4 rue Montagne du Parc
Brussels, Belgium

PRATT & WHITNEY ENGINES	HAMILTON STANDARD PROPELLERS	CHANCE VOUGHT AIRPLANES	SIKORSKY HELICOPTERS

Troubles shared are troubles halved

TYPICAL WICKMAN AID TO BETTER PRODUCTION



A Wimet plug gauge has been continuously employed on checking internally ground bores in nickel chrome gears for fifteen months. Throughout this period it has made a daily check on 350 components and yet still maintains strict manufacturing limits. Steel gauges made to same accuracy had previously to be replaced every 2 days.

Write for catalogue ST55

"Wimet" is the brand name of Wickman's Tungsten Carbide Tools, the hardest material made by man.

A NOTICEABLY higher incidence of smiling faces among production engineers, these days, is due in no small measure to the Wickman way. For the Wickman way is dedicated to sharing—and eventually solving—production problems. By supplying exactly the right machines and tools for the job, the Wickman way ensures time saving, cost cutting and higher quality production all along the line. Most important, of course, is the quick Wickman way of getting to grips with production problems . . . by using common-sense and vast experience. Bring the Wickman way into your production picture, by calling us any time!

THE Wickman WAY

A · C · WICKMAN LTD · COVENTRY · ENGLAND

For Multi-spindle Automatics of all types, and other specialised machinery and equipment.

LONDON · BRISTOL · BIRMINGHAM · MANCHESTER · LEEDS · GLASGOW · NEWCASTLE

AIR FRANCE ANNOUNCE

LONDON TO RIVIERA NON-STOP IN 3¾ HOURS

for NICE-CANNES-MONTE CARLO

ADDITIONAL SERVICES FROM MANCHESTER & GLASGOW

Starting June 14th, present service via Paris

NEW 4-ENGINE LANGUEDOCS seating 33 passengers, fly on this non-stop service. LONDON—a good lunch in the air with wine and food free of charge—and you are in NICE ready for the car that takes you along the Promenade des Anglais or to CANNES or MONTE CARLO. The return fare, Nice £34.6.0; Cannes or Monte Carlo £36, does not come from your currency allowance and the Riviera is making a point this summer of Sunshine and All-in accommodation at a pound a day. Other holiday services to PARIS, MARSEILLES, GENEVA, BASLE, ZURICH, CORSICA, ROME, NORTH AFRICA.

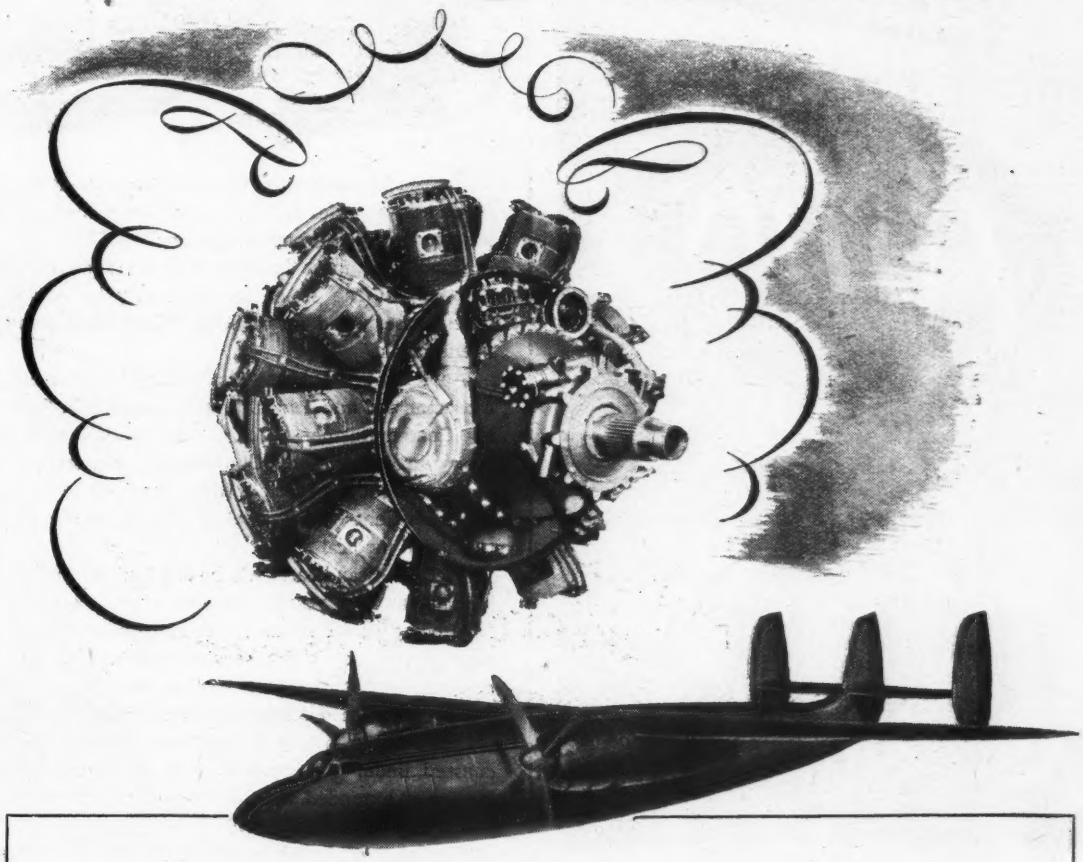
You can fly on these "same day" services, too, from MANCHESTER and GLASGOW. Ask your Travel Agent or AIR FRANCE at address below.

AIR FRANCE 52/4 HAYMARKET LONDON S.W.1 WHitehall 0971 (ten lines)

For maximum reliability and fuel economy

the Bristol Centaurus engines of the

AIRSPEED *Ambassador*



are fitted with

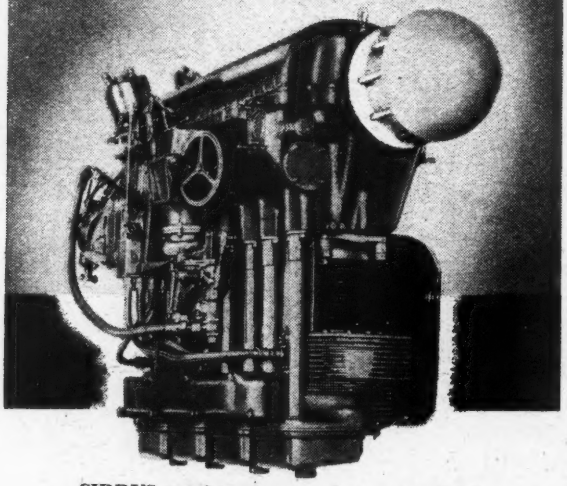
Hobson

INJECTION CARBURETTERS

H. M. HOBSON LTD., WOLVERHAMPTON *(Licensees in U.S.A. and Canada, Simmonds Aerocessories Inc).*

you know you will get there with

Cirrus



CIRRUS engines have a long record of success in many countries and in a great variety of light aircraft, and are now showing their worth in the new light planes being built by many leading manufacturers.

"MINOR" Series II 100 h.p.
"MAJOR" Series II 150 h.p.
"MAJOR" Series III 155 h.p.

BLACKBURN AIRCRAFT LTD
BROUGH, E. YORKS.

Aircrew vacancies again

For the first time since the end of war the Royal Air Force has vacancies for volunteers direct from civilian life to train as Pilots and Navigators.

Candidates must be physically fit, aged between 17½ and 21 (the upper age limit may be waived in special cases), and up to School Certificate standard in education.

Applicants should take a certified statement of character and educational level to any R.A.F. Recruiting Centre (former A.T.C. Cadets should also take their Progress and Confidential Reports), and volunteers judged suitable will be sent to an Aircrew Selection Centre for interview, flying aptitude, educational and medical tests.

Successful candidates will be engaged for five years' regular and four years' reserve service, a gratuity of £200 being paid on transfer to the Reserve to those not selected for short service commissions or for re-engagement to complete time for pension.

Short service commissions in the General Duties Branch will in future be granted only to aircrew enlisted under this scheme, and to airmen already serving on extended service, to a proportion of whom permanent commissions will be open later on.

Full details of the scheme including medical standards required are given in Air Ministry Pamphlet No 96, obtainable from any R.A.F. Recruiting Centre or from the Air Ministry, Dept. FLC4, Victory House, Kingsway, London, W.C.2. Apply without delay.

Royal Air Force

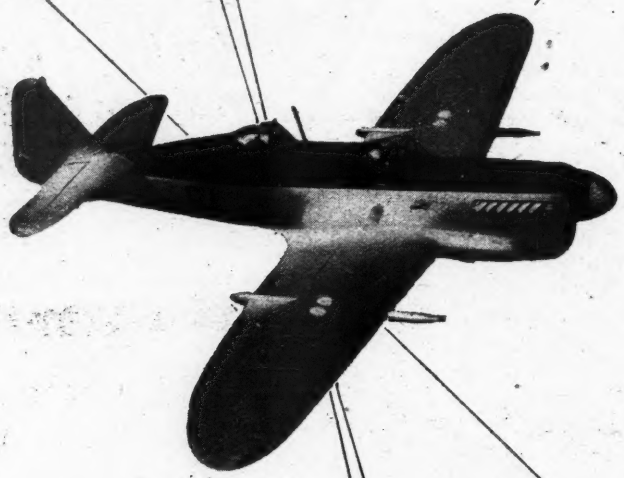
BRITAIN'S FIRST LINE OF DEFENCE

HIGH TENSILE STEEL CASTINGS FOR AIRCRAFT
AUSTER
AVRO TUDOR
PERCIVAL PRINCE
SHORT STURGEON
PERCIVAL PROCTOR
DE HAVILLAND HORNET
AIR SPEED AMBASSADOR
BRISTOL BRABAZON
SHORT SUNDERLAND
WESTLAND WYVERN
SPECIFICATIONS DTD 666 and DTD 705
The Aircraft Steel Castings Division of the David Brown Foundries Company is approved by the Aeronautical Inspection Directorate and by the the Air Registration Board for the production of steel castings to these specifications.
Aircraft designers should appreciate that DTD 666 and 705 steel castings, produced by an AID or ARB approved foundry, generally carry no weight penalty as compared with corresponding steel forgings.
Speed in delivery, flexibility of design, elimination of die costs, ease of design modification and excellent machinability are a few of the outstanding reasons why most leading aircraft concerns now use DAVID BROWN high tensile steel castings.
DAVID BROWN FOUNDRIES COMPANY
David Brown
THE DAVID BROWN FOUNDRIES COMPANY
PROPRIETORS DAVID BROWN & SONS (HUDDERSFIELD) LIMITED
PENISTONE NR. SHEFFIELD ENGLAND

THE FAIREY OPERATIONAL TRAINER

Training

the Sure Foundation of a Fighting Service



THE FAIREY OPERATIONAL TRAINER
already adopted by
The Royal Navy,
Royal Canadian Navy
and Royal Netherlands Navy.

Fairey

THE FAIREY AVIATION CO. LTD
HAYES, MIDDLESEX

London Office : 24 Bruton St. London W.1. : May Fair 7911

FLIGHT and AIRCRAFT ENGINEER

Editorial Director G. GEOFFREY SMITH, M.B.E.
Editor - - C. M. POULSEN
Assistant Editor - MAURICE A. SMITH, D.F.C. (WING CDR., R.A.F.V.R.)
Art Editor - - - JOHN YOXALL

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

Editorial, Advertising and Publishing Offices: DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1
Telegrams : Flightpres, Sedist, London. Telephone : Waterloo 3333 (60 lines.)

COVENTRY: 8 - 10, CORPORATION ST. Telegrams : Autocar, Coventry. Telephone : Coventry 5210.
BIRMINGHAM, 2: KING EDWARD HOUSE, NEW STREET. Telegrams : Autopress, Birmingham. Telephone : Midland 7191 (7 lines).
MANCHESTER, 3 : 260, DEANSGATE. Telegrams : Iliffe, Manchester. Telephone : Blackfriars 4412.
GLASGOW, C.2 : 26B, RENFIELD ST. Telegrams : Iliffe, Glasgow. Telephone : Central 4857

SUBSCRIPTION RATES : Home and Abroad : Year, £3 1 0. 6 months, £1 10 6.

No. 2052 Vol. LIII April 22nd, 1948. Thursdays, One Shilling

The Outlook

A Good Beginning

FOR the first time in its history, the British flying boat has been given reasonable terminal facilities. B.O.A.C.'s new marine air base at Southampton is well equipped to deal with passengers, freight and mails. The tedious and time-wasting expedient of launch transport has been eliminated, and the Corporation will save time and money by having the flying-boat terminal close to its repair and maintenance base at Hythe, thus avoiding the "dead flying" entailed while the terminal was at Poole.

The terminal, as a terminal, is all that could be desired, or at least all that is necessary for the present and for some considerable time to come. Comfort of passengers is well looked after, and ground transport from London, by coach at first but doubtless by rail later, will be reasonably fast.

When, however, it comes to the actual handling of the flying boats on the water, the Southampton base could undoubtedly be better. The arrangement of the floating pontoons is neat, but the surrounding water space is narrow, and coming up to the mooring buoy with a following wind and tide will require a fair degree of skill. We are not overlooking the fact that B.O.A.C.'s captains possess that skill, but they will be handicapped a good deal by the fact that reversible-pitch airscrews are not yet fitted. They would make it so much easier for the pilot to have a second shot if the buoy was not picked up at the first attempt, a thing which can easily happen when wind and tide are awkward.

In a really thick fog, with the amount of surface shipping in Southampton Water, there will possibly be occasions when flying-boat operation is difficult, not to say impossible. But fortunately the number of days in the year when conditions are really bad is not large, and the flying boat is in some ways better off than its landplane counterpart in that it can, if necessary, alight some distance from the base and taxi slowly towards it.

The Fate of the Flying Boat

A PERIOD of five years is foreseen as the life of the new Southampton terminal, but this may well be extended if there is much more delay in choosing the site for the ultimate base. This choice, in turn, is, apart from questions of suitability, conditioned by a Cabinet decision on the fate of the Saunders-Roe flying boats. It had been hoped that Lord Nathan would make some pronouncement when he opened the Southampton terminal last week, but his speech contained no hint, unless one may so regard the stress which he laid on the difficulty of finding suitable sites on the air routes for marine-aircraft bases.

We cannot help feeling that the Minister of Civil Aviation has been somewhat ill advised on this subject. The flying-boat route which, Sir Harold Hartley forecast, will be opened on May 4th with Solents, will operate partly from rivers in which, the theorist would claim, there must be considerable risk of striking floating objects. In practice it is found that these risks are confined to certain seasons and can, therefore, be guarded against. Mostly they are in the form of "floating islands," and the launches from the base just poke their bows into them and push them out of the way. B.O.A.C. captains with practical experience certainly do not share Lord Nathan's pessimism. And as for emergency landings, there are far more water spaces possible for flying boats than there are airfields on which most of the landplanes could be put down with any degree of safety.

As for the cost of such bases, the result of the Saunders-Roe investigation agreed to by B.O.A.C., has now been submitted to the Ministry of Supply, and the estimated cost for a mobile base is only £70,000. Compared with present airport costs that expense is negligible, and a chain of them on Empire routes could be supplied for a fraction of the cost of a land airport.

It may be recollected that in B.O.A.C.'s report the cost of flying-boat maintenance compared very favour-

ably with that of landplanes. The Hythe boats on long Empire routes required only an average of 4.5 man-power-hours per flying hour on direct maintenance.

To sum up the whole situation, direct operating costs of flying boats are not high; maintenance cost is low; bases are not expensive (the new one at Southampton has cost something like £140,000, but that is a terminal, and bases en route could, as the Saunders-Roe estimate indicates, be built for half that amount); the boats themselves are no more expensive to buy than comparable landplanes; and the public already likes flying boats. It would like them even better if improved facilities were provided on the routes.

It is difficult to see why there has been all this delay in deciding the fate of the Saunders-Roe SR/45s. In the Select Committee Report, to which we referred briefly last week, the observation is made that it is surprising that neither the Brabazon nor the Saro SR/45 project was included in the Prime Minister's priority list. The report further states: "In view of the expenditure already incurred, the importance of both projects to British civil aviation, and the rapid obsolescence of modern aircraft, your Committee recommend that every step be taken both to expedite their completion and to ensure the immediate production of the aircraft if they should prove to be successful."

The Miles Tragedy

AFTER prolonged negotiations, and repeated adjournments of hearings in the High Court of Justice, creditors and shareholders in Miles Aircraft, Ltd., have agreed to accept the scheme put forward by the Receiver, thus avoiding going into liquidation.

That financial losses are entailed in the reconstruction scheme is regrettable, but what, from the national point of view, is a greater loss is that the Miles family team is separated from the concern which it built up with so much enthusiasm during many years. That the Miles brothers and their wives will quit aviation altogether is unthinkable, and it would be a pity if they did. Few designers have shown such originality, as the flow of new types from the Woodley factory has testified. It may be that this was one of the troubles which led to the present unfortunate position, but British aviation is in need of people with ideas, and some means must be found to enable the Miles family to go on contributing their quota.

The one bright spot in an otherwise sombre picture is that, although Miles Aircraft, Ltd., will gradually cease to exist, the Miles Marathons are to be built by Handley Page, Ltd. For some time there was some doubt about the willingness of the Government to implement the order for 50 of these machines, but it is now certain that at least 40 will be ordered, if not the whole 50. Thus an aircraft type which promises to become very useful will be saved from extinction.

CONTENTS

Outlook	427
Meteor's Stable-mate	429
Gyrodynes and Fireflies	433
Fratricidal Frolic	434
Civil Aviation News	436
Trans Canada with T.C.A.	439
Casual Commentary	443
Here and There	444
Ace in the Air	446
The New Marine Air Terminal	449
Visual Aids for Low Visibility Conditions	450
Correspondence	452
Service Aviation	453

Forthcoming Events, page 452

THE FAIREY GYRODYNE. *The first prototype has completed a series of trials and has now been stripped for detail examination. The second prototype is finished and ready for flying. Other pictures will be found on p. 433.*

Crown Copyright Reserved

Shown to particular advantage in this frontal view of the new Gloster fighter are the air brakes, flaps, and "nostril" intakes.

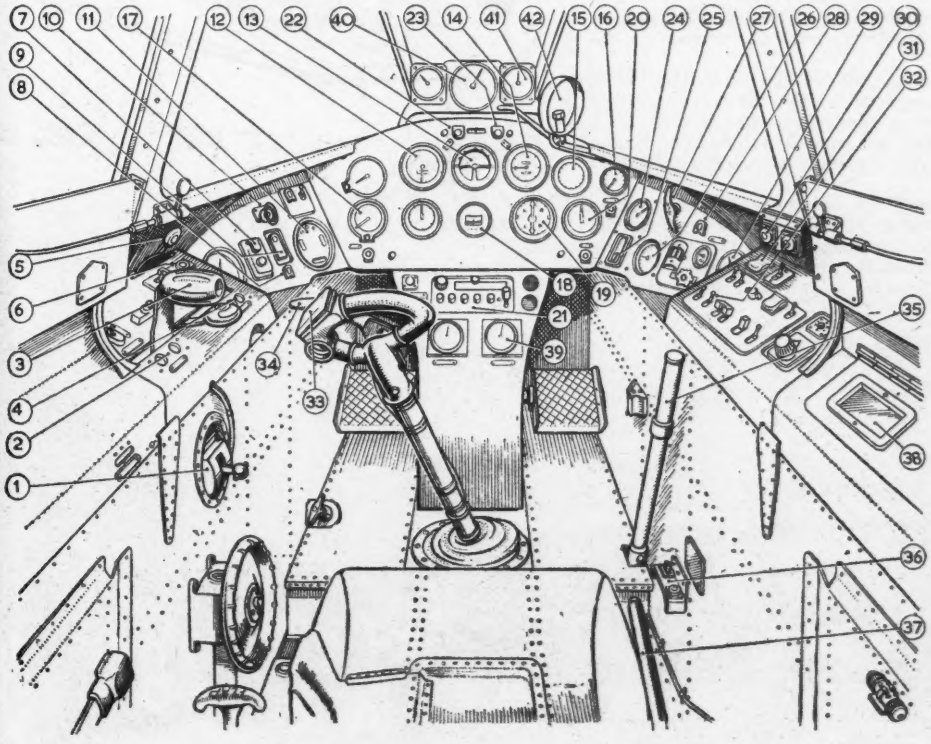
Meteor's Stable-mate

An Exposé of the Nene-powered Gloster E.1/44

BEFORE the S.B.A.C. Display last year, the news leaked out that the first prototype of a new Gloster jet fighter had met with a mishap while being delivered by road to Boscombe Down for initial trials. It was further rumoured that the machine was powered by a single Rolls-Royce Nene turbo-jet, and that it was named the Ace. Except that no name has been allotted—the type being known by its official specification number, E.1/44—these reports can now be confirmed and a detailed description becomes permissible.

The second "E.1" made its first flight some weeks ago, at Boscombe Down, with S/L. Waterton as pilot, and has lately returned to the Gloster airfield at Moreton Valence for development flying.

That the design is far removed from the classic twin-jet Meteor formula, and that it bears a superficial resemblance to the historic E.28/29 is obvious from the photographs; but whereas the "E.28"—the first jet aircraft to fly in Great Britain—had a straight-through duct for its B.T.H.-Whittle turbo-jet, the Nene fitted to the new fighter breathes through "nostril" intakes. The fighter, of course, is a larger and much heavier machine,



PILOT'S PANORAMA

1. Flap selector. 2. Air brake selector. 3. Throttle. 4. Dive-recovery flap selector. 5. Ventilating control. 6. Relighting switch. 7. Undercarriage selector. 8. Undercarriage warning lamp. 9. Flap indicator. 10. Hood jettison handle. 1. Undercarriage indicator. 12. A.S.I. 13. Artificial horizon. 14. Rate of climb indicator. 15. Engine speed indicator. 16. Oil temperature gauge. 17. Machmeter. 18. Direction indicator. 19. Turn and bank indicator. 20. Exhaust temperature gauge 21. Radio controller. 22 Engine fire warning lamp. 23. Main tank fire warning lamp. 24. Burner pressure gauge. 25. Oil pressure gauge. 26. Fuel contents gauge. 27. Undercarriage emergency release. 28. Cabin air pressure warning lamp. 29. Pressure cabin altimeter. 30. Hood operating push switches. 31. Engine fire extinguisher push switch. 32. Gun sight on/off switch. 33. "Press to transmit" switch. 34. Brake lever. 35. Hydraulic emergency hand pump. 36. Tail parachute open and jettison switches. 37. Seat adjustment lever. 38. Map case. 39. Rear bearing temperature gauge. 40. Blower delivery pressure gauge. 41. Plenum chamber pressure gauge. 42. Accelerometer.

Meteor's Stable-mate Gl

but that it bears the stamp of the pioneer E.28 is a tribute to the advanced thinking of Mr. W. G. Carter, chief designer to the Gloster Aircraft Co., and his staff.

It must not be supposed that the E.1/44 represents Gloster's last word on jet-fighter design. Performance remains to be determined, but in speed and climb the machine is unlikely to prove greatly superior to the Meteor IV. With 428 gallons of internal fuel, however, the range should be appreciably longer. A production order for the R.A.F. is unlikely.

Salient features of the design are a mid-wing, a very broad fuselage and a wide-track undercarriage. The centre-section of the wing, to which the flaps, main undercarriage, dive-recovery flaps, and inboard air-brake flaps are attached, may be considered as a single-spar stressed-skin structure with an auxiliary rear spar. Both spars have plate webs, but while the booms of the main spar are of high-tensile steel, the rear spar has light-alloy booms. The nose, inter-spar and tail ribs are of flanged-diaphragm type. Of similar construction to the centre plane, the outer portions ot the wing are fixed at the spars and at the leading edge.

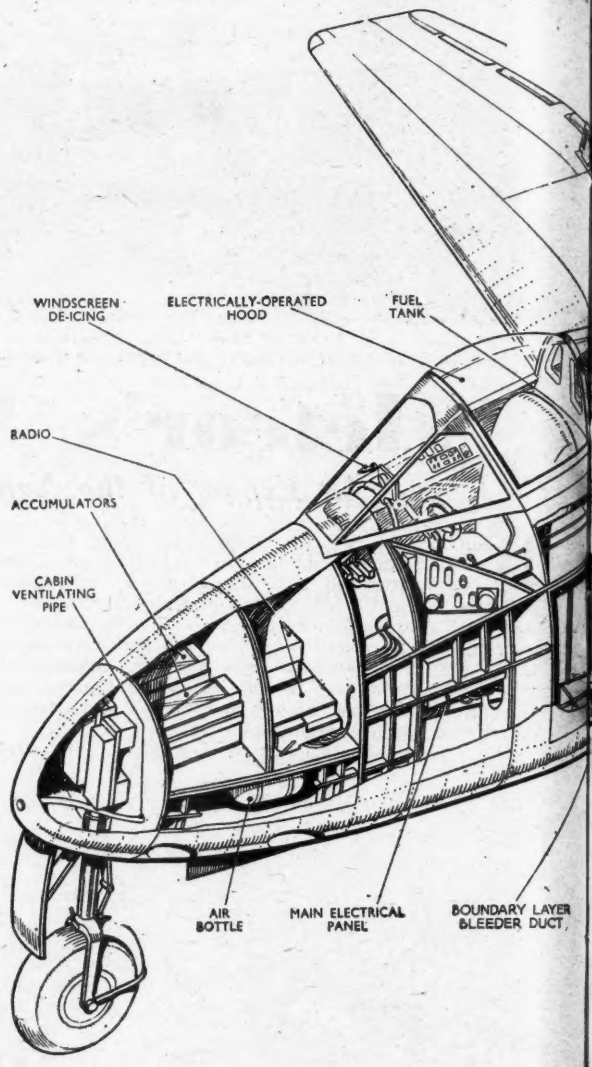
Two fore-and-aft webs form the basis of the front fuselage structure, in conjunction with the floor and the cabin walls, which carry the top longerons. The bottom longerons and the outer webs, on which the four Hispano 20 mm. guns are mounted, are attached by lateral diaphragms at the bottom of the main webs; the frames, and other contour-forming members, are built on to this structure. Resembling that of the Meteor, the cockpit enclosure has an electrically actuated sliding and jettisonable hood and a bullet-proof windscreen.

Central Fuselage

The front of the fuselage is attached by the four longerons to the central portion. This latter, which the G.A. drawing shows to be unusually wide, houses the turbo-jet unit, provides attachments for the wing centre-section, and is built up of reinforced Z-section frames, with heavy double-channel section frames for the main spar and power unit attachments. Built into the sides are the detachable air intakes, with boundary-layer bleeds. Semi-monocoque construction, with reinforced Z-section frames and top-hat stringers, is used for the rear fuselage, which is riveted on. Similar construction is seen in the detachable tail portion.

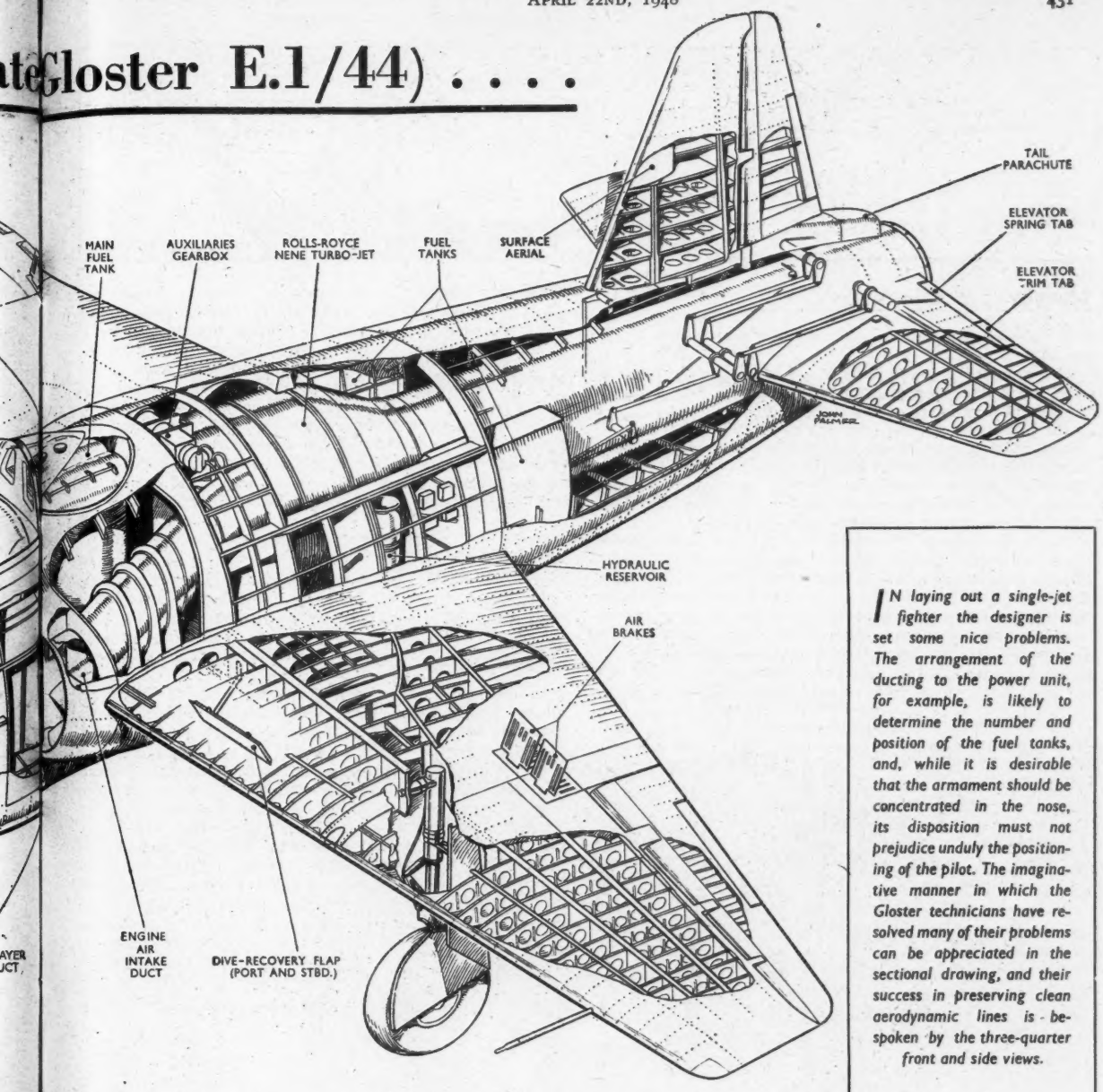
Excepting the upper portion of the fin (which is of wood, to insulate the surface aerial), the components of the tail unit are all-metal, stressed-skin structures. Each elevator has a spring tab and trimmer tab and the rudder has a balance tab. All control surfaces are internally mass-balanced.

Of conventional layout, the flying controls have spring torque shafts incorporated in the elevator and aileron control runs to operate the spring tabs. The spade-grip control column and adjustable rudder bar are connected to their respective surfaces by push-rods, and the elevator

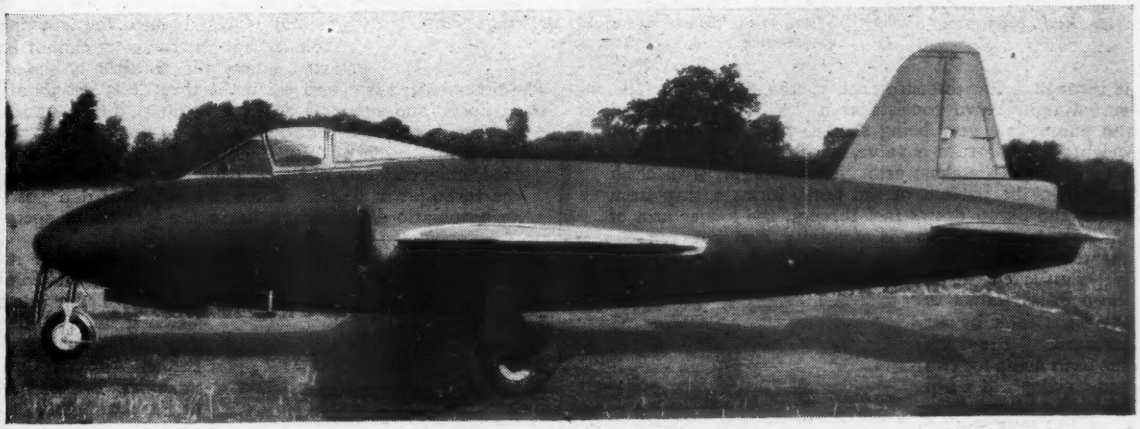


Crown Copyright Reserved

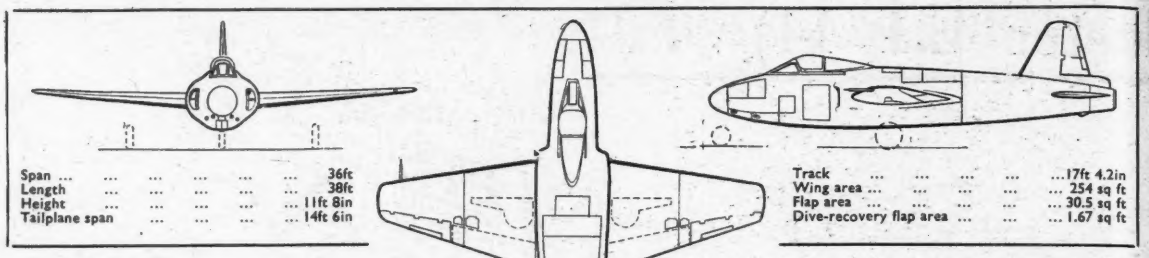
...te Gloster E.1/44) . . . .



IN laying out a single-jet fighter the designer is set some nice problems. The arrangement of the ducting to the power unit, for example, is likely to determine the number and position of the fuel tanks, and, while it is desirable that the armament should be concentrated in the nose, its disposition must not prejudice unduly the positioning of the pilot. The imaginative manner in which the Gloster technicians have resolved many of their problems can be appreciated in the sectional drawing, and their success in preserving clean aerodynamic lines is bespoken by the three-quarter front and side views.



Crown Copyright Reserved



Span	36ft
Length	38ft
Height	11ft 8in
Tailplane span	14ft 6in
Track	17ft 4.2in
Wing area	254 sq ft
Flap area	30.5 sq ft
Dive-recovery flap area	1.67 sq ft

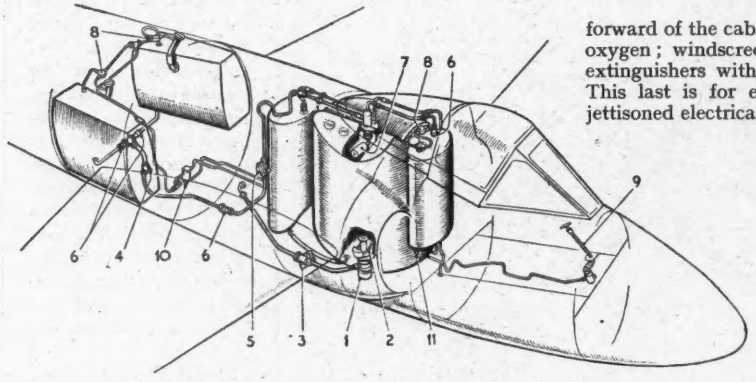
Meteor's Stable-mate . . . . .

trim tabs are coupled to a hand-wheel by chains and cables.

The tricycle undercarriage is of exceptionally wide track and comprises a rearward-retracting, non-steerable, castering nosewheel unit, mounted on the first fuselage bulkhead, and two independent inward-retracting units attached to the centre-section spar. All three units have Dowty oleo-pneumatic shock absorbers. Operation is hydraulic and locking mechanical. The wheels have Dunlop pneumatic brakes, and there are electrical indicators and an electrical ground lock.

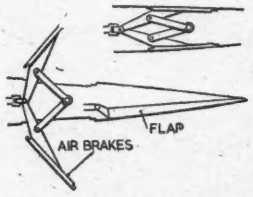
The trunnions on the Rolls-Royce Nene turbo-jet, of 5,000 lb static thrust rating, are mounted in blocks attached to the power-unit frames in the centre fuselage. A steadying strut beneath connects the lower casing of the Nene to the fuselage structure. A total of 428 gall. of fuel is carried in five internal tanks. The basic tanks (main and engine-bay) are respectively of 235 and 53 gall. capacity and are mounted in the centre fuselage; there are two overload tanks of 48 gall. capacity each in the rear fuselage, and one of 44 gall. in the front fuselage.

An electric pump on the underside of the main tank draws fuel through an inverted-flight valve and delivers it through a low-pressure cock to the turbo-jet. The inverted-flight valve consists of a "Y" tube attached to the pump, one arm being shorter than the other. A weighted arm carries a valve, which, when the aircraft inverts, seals the short arm. A diaphragm, with clack valves, in the bottom of the tank, forms a trap from which the pump draws fuel through the longer arm of the "Y" pipe. There is a gravity feed between the main tank and the engine-bay tank, and fuel is transferred from the overload tanks to the main tank by air pressure. Provision has been made for two under-wing drop tanks, as alternatives to bombs or groups of rocket projectiles.



Disposition of the E.1/44's internal fuel tanks. Items shown are: (1) fuel pump, (2) inverted-flight valve, (3) low-pressure fuel cock, (4) drain valve, (5) fuel-pressure warning switch (overload), (6) non-return valves, (7) float valve, (8) vent valves, (9) air transfer control, (10) pressure-relief valve, (11) drain valve

The air intake ducts are divided to pass round the spar and lead into a plenum chamber, or pressure casing, enclosing the complete power plant. Mounted on top of the engine-bay tank is an auxiliaries gear box, driven by a shaft from the Nene. A Dowty Live Line hydraulic pump, driven from the gear box, supplies power for the undercarriage and flaps; a hand-pump operates all services, and an emergency compressed-air system is provided for the undercarriage. The rotary control valves for the various circuits are electrically operated. For charging the pneumatic air bottle, which supplies the wheel brakes, there is a gearbox-driven compressor. Differential braking is effected from the rudder pedals.



Showing the action of the air brakes and the housing of the split trailing-edge flaps.

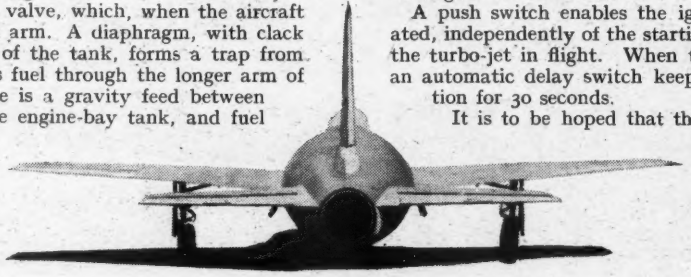
A 1,500-watt HX2 generator, driven from the gear box, charges two 12-volt accumulators (in series, to give 24-volt output) which supply power for the electrical services. Two-way radio and I.F.F. equipment are carried forward of the cabin, and miscellaneous equipment includes oxygen; windscreen de-icing, by ethyl-alcohol spray; fire extinguishers with flame detectors; and a tail parachute. This last is for experimental flying, and is opened and jettisoned electrically. A fire-extinguisher bottle in the front fuselage supplies a spray ring round the main tank, and a second bottle, in the centre fuselage, supplies two rings, one round the power unit and the other round the engine-bay tank.

Safety Throttle

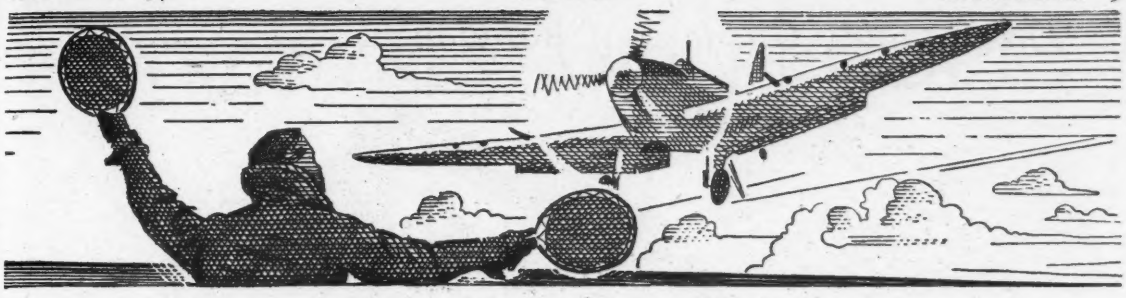
A point of interest concerning the throttle lever, mounted in a slide on the port side of the cockpit, is that the lever automatically operates two micro-switches. One switch is closed when the lever is in the "shut" position and is wired into the starting circuit so that the turbo-jet cannot be started unless the throttle is closed. The other switch is closed when the throttle is less than a third open, and operates a warning lamp if the undercarriage is not locked down.

A push switch enables the igniter plugs to be operated, independently of the starting circuit, for relighting the turbo-jet in flight. When the switch is depressed, an automatic delay switch keeps the igniters in operation for 30 seconds.

It is to be hoped that the E.1/44 will make an appearance, in company with the latest Meteors, at the display by the Society of British Aircraft Constructors, to be held at Farnborough.



Crown Copyright Reserved



NEW SMITHS INSTRUMENTS

Smiths Sensitive Airspeed Indicator

Ease of reading, accuracy and lightness are combined in this new Smiths instrument. The use of separate scales for the two pointers makes readings quick and unmistakable. Each division on the outer scale represents 2 m.p.h. or knots. Accuracy is remarkable throughout the range. The instrument, designed for aircraft in the 500 m.p.h. class, is already in use on high-speed military aircraft.

Available in cases to international standard dimensions in the following ranges:

50–500 knots 50–600 m.p.h.

In all matters of instrument needs and problems Smiths offer close co-operation with the industry the world over — a comprehensive technical service backed by unique manufacturing facilities.

SMITHS AIRCRAFT INSTRUMENTS LIMITED

The Aviation Division of S. Smith and Sons (England) Limited

CRICKLEWOOD · LONDON · N.W.2 · ENGLAND

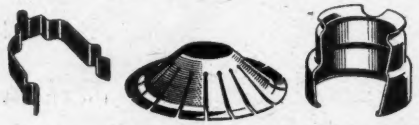
A139

The Hanging Gardens of Babylon

One of the seven wonders of the ancient world. The Hanging Gardens of Babylon were built for the benefit of Nebuchadrezzar II (c 604—561 B.C.) On each terrace flourished beautiful flowering shrubs and trees which were irrigated by water pumped from the River Euphrates below.

IN CONTRAST to the grandiose wonders of the past, one marvels today at the small components which have made the modern machine age possible. Some of the most important of these are the presswork parts produced by Terry's. Each is a gem of precision engineering, immensely strong and designed to perform one specific job. Terry's have designed tens of thousands of different presswork parts during their ninety years' experience in this subject and their output runs into millions of parts per year.

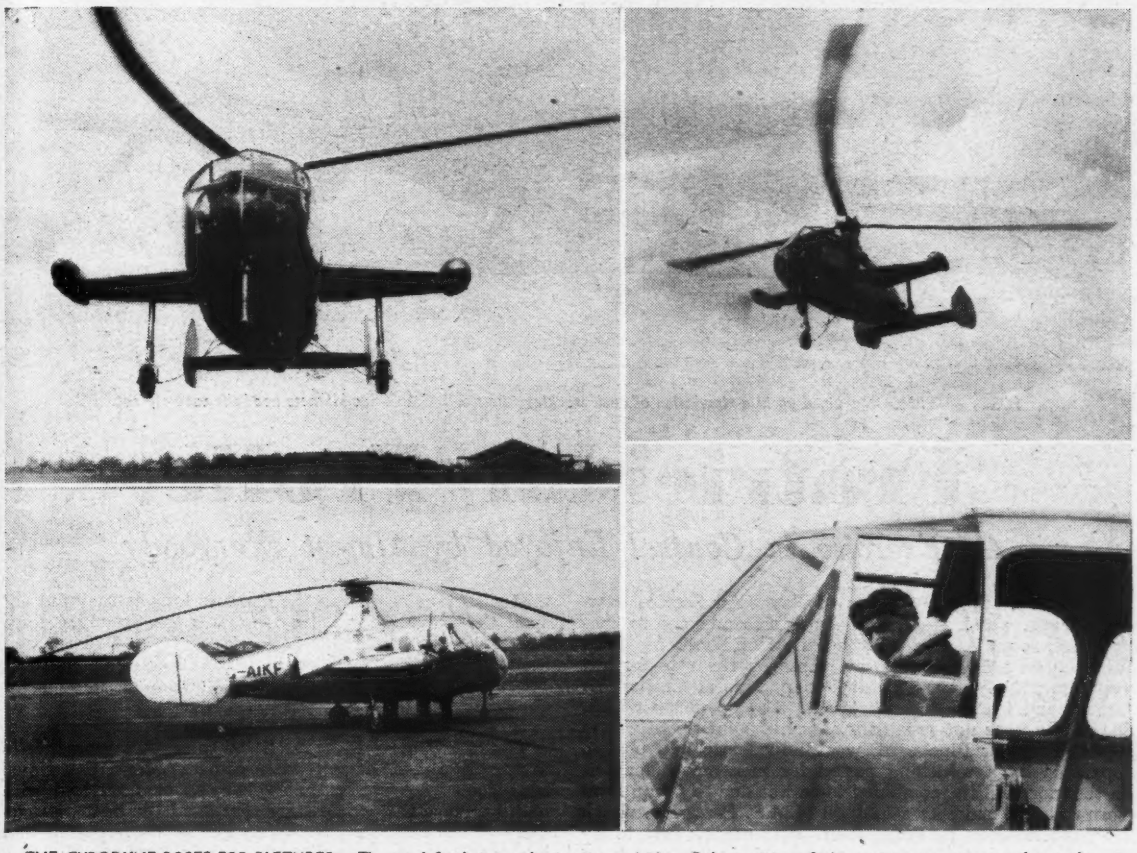
If *you* have a presswork problem no one is so well placed as Terry's to solve it.



TERRY'S FOR PRESSWORK

HERBERT TERRY & SONS LTD REDDITCH

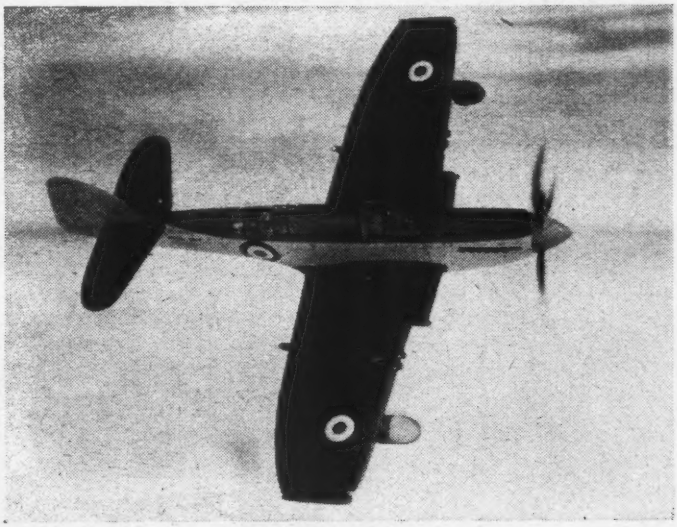
GYRODYNES AND FIREFLIES



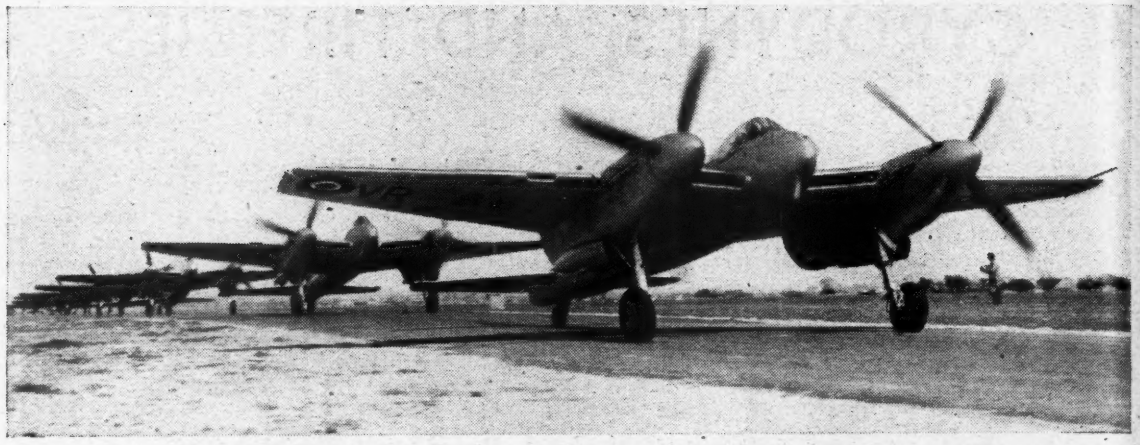
THE GYRODYNE POSES FOR PICTURES. The top left photograph gives a good idea of the position of the anti-torque rotor on the starboard wingtip. The pronounced droop, due to the flexibility of the main rotor blades, is well brought out in the picture on the left. The vertical tail surfaces are not used as rudders, but were made adjustable should a certain amount of directional trim be necessary. In the lower right-hand picture is seen S/L. B. H. Arkell, who is doing the test and development flying of the Gyrodyne.

THE Fairey Gyrodyne, exhibited at the S.B.A.C. Show at Radlett last year, made its first free flight on December 7, 1947. Since that time the machine has made longer and longer flights, at greater and greater speeds, piloted by S/L. Basil Arkell. The first prototype has now completed most of its trials and has been dismantled for a thorough examination. If this does not show any need for modifications, the second prototype, which is completed and ready, will be given even more exhaustive tests.

In addition to the release of the first flying pictures of the Fairey Gyrodyne comes the news that the latest variant of the Firefly—the Mark V—is now in production for the Royal Navy. The new version can be used for fighter reconnaissance, night flying or anti-submarine duties, and is designated F.R.V., N.F.V. or A.S.V. according to its equipment. The F.R. machine carries the same radar equipment (in a nacelle under the starboard wing) as the familiar Mk. IV version, and is equipped with beam approach, I.F.F., and communications radio. In the N.F.V. night fighter the basic radar and radio gear of the F.R.V. is retained, and, in addition, there is a radio altimeter and tail-warning device. The anti-submarine A.S.V. has the same radio and radar installations, but carries special submarine detection apparatus in the form of "sono" buoys beneath the wings and fuselage.



It will be gathered from this "Flight" photograph of a Firefly V that there are no major external differences from the Mark IV.



FORD, AFTERNOON : Lined up in a simulation of deck stacking, the No. 1 C.A.G. Sea Hornets head the take-off list.

Fratricidal Frolic

An Exercise in Control Enjoyed by Almost Everybody

As part of the programme of Naval Air Service exercises, which started on April 12th and are to conclude on April 24th, the School of Naval Air Warfare laid on a day's outing on Thursday the 15th for aircraft from No. 1 Carrier Air Group, No. 14 Carrier Air Group, and from S.N.A.W. itself. The operation which, thankfully, was not saddled with some pointless title such as Fandango or Bluebeard, was divided into two phases, separated by a refuelling period for men and machines. In the morning, the combined force was due to fly up from Cornwall and make an attack on H.M.S. *Peregrine*, which landlubbers know as Ford, then, after lunch, were to fly back to the West Country and make a similar attack on St. Merryn.

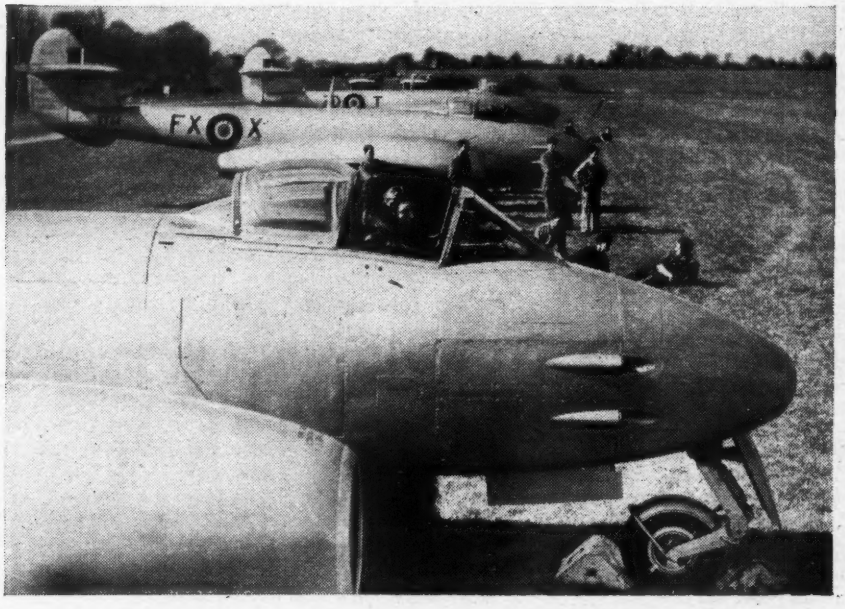
Although this particular day's exercises were primarily Naval, and were designed to afford practice in routing, forming up and delivering an attack, the R.A.F. were permitted to take a hand in the game so long as they did not spoil the Naval show. To this end, the attacking force was to be intercepted by Vampires from Odiham and Meteors from Tangmere at the G.C.I. bidding of Southern Sector Control, 11 Group, Fighter Command.

R.A.F. Participation

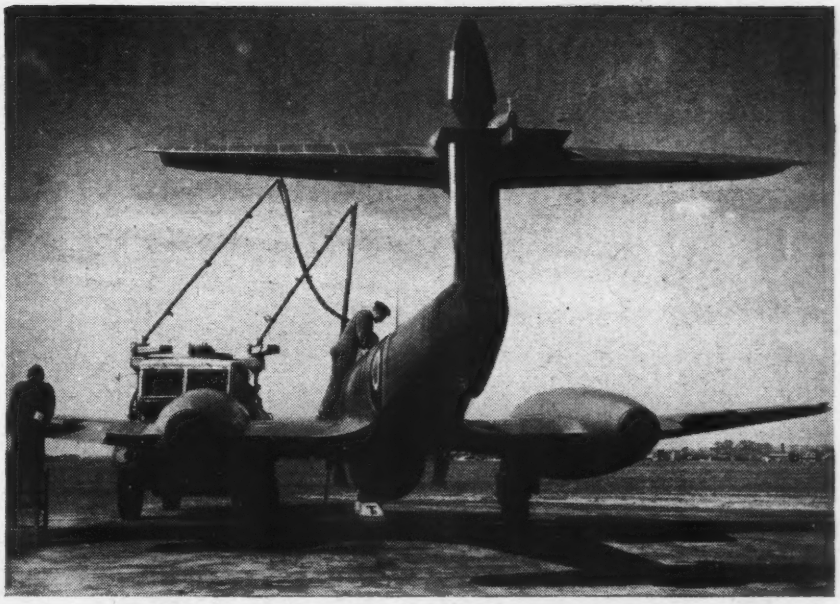
The R.A.F. were to be restricted to providing practice in interception and attack with camera guns; the Naval squadrons were not to be broken up or interfered with unduly, since this would have disrupted the neat arrangement of the exercise. However, everybody expected that it would be quite good fun, the pale gold of the sunshine lighted the morning, scarves of cirrus mantled the pure cobalt of the sky, Sussex wore her fresh new dress of green, and it was very pleasant to be young and untroubled.

Necessarily, since we were at Tangmere, we could not view the exercise as a whole, but in that the Station's Meteors seemed to suffer more than anyone else at the hands of Control, we were, in the event, in a better position to assess the working quality of the system. It should, however, be pointed out that, in making this commentary, we have not been able to read the inquest report on the exercise and are thus able only to give that part of the story that we actually witnessed.

The Tangmere Meteors, four Mk. IVs and a Mk. III, were at readiness at 10.45 hours. Fully fuelled up and argent in the sun, they waited in line just off the end of the runway. At 11.12, Southern Sector Control gave the order



TANGMERE, MORNING : Ready in their cockpits, the pilots sit watching the control tower for the Very signal to start engines and get off to the attack.



TANGMERE, MORNING: Having taxied to the leeward end of the runway, the defending Meteors are refuelled prior to awaiting the order to scramble.

to scramble; two Very flares curved into the sky from the control tower and the Tangmere part of the operation was "on." We, in the control tower, were able to listen in to the R/T instructions from G.C.I. to the Red (Tangmere) force, but reception was absolutely shocking.

Climbing on a given vector of 240 deg, the Meteors were sent up to 14,000ft, which Red leader reported attaining 2 min 20 sec after take-off. Unfortunately, as we have already pointed out, the R/T gibberish was punctuated with sanity so infrequently that it was difficult to follow precisely what the Meteors were doing, but the accuracy of what we were able to understand was confirmed by the remarks of Red leader when he got back to base, a somewhat irritated aviator.

Put concisely, the Tangmere force were taken to 14,000ft on a course which sent them S.W. of the Isle of Wight and were then given a series of vectors by Control, finally to be told that the attacking force were in such-and-such a position; however, despite excellent visibility, the Meteor pilots were unable to see the Naval squadrons. Then, some little time later, when, after a further period of chasing about, Red leader did see the attackers, and wanted to engage, his force was controlled off, and the Vampires from Odiham appeared on the scene and attacked. By the time the Meteors were able once more to make an engagement, the enemy had crossed the Selsey line into the "safe" area, and the interception was scrubbed.

Control Faultiness

It would seem that Sector Control were at fault (a) in telling the Red force that the enemy were somewhere where they were not, and (b) in not permitting the Meteors to make an attack until too late.

Exercises of this kind, if they show up rustiness in the organization, are of great value from this aspect alone, but on the basis of our wartime experience of G.C.I. and fighter defence, one would have imagined that the whole system must have attained something near perfection, and we cannot assess it as anything but pitiable that such woolliness as was apparent during this exercise could exist.

After lunch at Tangmere, we motored the few miles over to Ford, prepared to cover phase 2 of the day's work from the Naval side. This, unfortunately, proved to be impossible, as the Navy were operating on their own frequencies and could not cover the R.A.F. side of the work.

The Navy were brisk and efficient, and we understood from the Commander (Air) that the Naval side of the operations were simulations of attacks from ship-borne forces. That is to say, the aircraft attacking Ford in the morning were taken as having originated from carriers and, likewise, the afternoon's return attack on St. Merryn was to be similarly conceived.

Take-off from Ford was scheduled for 15.20 hours and the aircraft congregated at the end of the runway to take up stacked line positions for simulation of deck take-off. First away were the Sea Hornets taking off in alternate pairs and respectively swerving to port and starboard into their initial climb. The 20 m.p.h. wind out of the south-south-west was about 60 deg off the runway and this, coupled with slipstream turmoil from preceding aircraft, made some of the following machine swerve rather widely. Following the Sea Hornets came the Firebrands, the lumbering take-off of which was in marked contrast to the neat celerity of the Seafires which were closely pursued by the Fireflies. All forty-four aircraft were airborne in 14 minutes. The various sections formed up and, all heading on different courses, vanished into the mild afternoon sky.

FORD, AFTERNOON: Seafire 47s of No. 14 C.A.G. sitting, slim, ready and eager for instructions to leave.

CIVIL AVIATION NEWS

OVER THE OVERCAST: The Alps from a Swissair Dakota. After June 14th there will be a daily service between London and Geneva.

Aircraft Requirements Committee : Crash at Shannon

A.B.A. STRIKE FINISHED

IT is understood that after a five-month strike agreement has been reached, on the question of wages and holidays, between A.B.A., the Swedish airline, and the Swedish Transport Workers' Union. 1,200 employees of the airline made demands on November 28th, 1947, which would have entailed more than 4½ million Swedish crowns extra cost to A.B.A. During arbitration it is known that the workers reduced their demands to 3.1 million, but the airline was unable to increase by more than 1 million—an offer which was rejected at the time. The strike was the first to have interrupted operations since A.B.A. was founded about 24 years ago.

CONFIDENCE TRIP

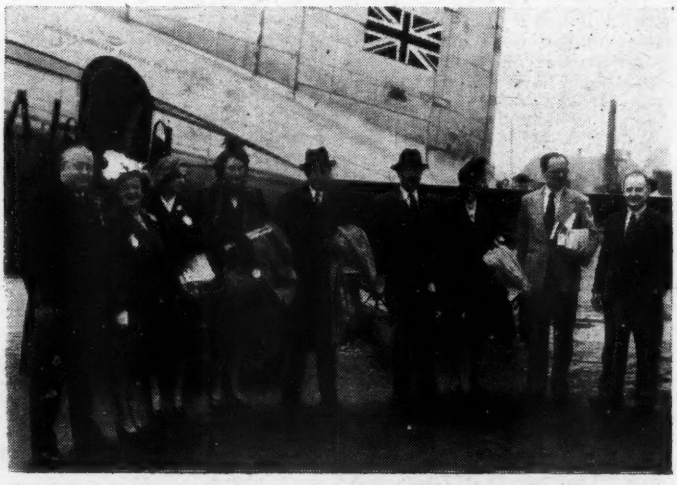
TO finalize many business contracts in South America, particularly in Brazil and the Argentine, and to show their confidence in the Avro Tudor IV, Sir Frank Spencer Spriggs, Managing Director and Deputy Chairman of the Hawker Siddeley Group, and Sir Roy Dobson, Managing Director of A. V. Roe & Co., Ltd., have left England on a special charter flight to Buenos Aires in the B.S.A.A. Tudor *Star Panther*.

The aircraft, piloted by Capt. D. M. Walbourn, is expected to reach Rio on April 19th and Buenos Aires one day later. The charter is due to terminate at London Airport on May 8th.

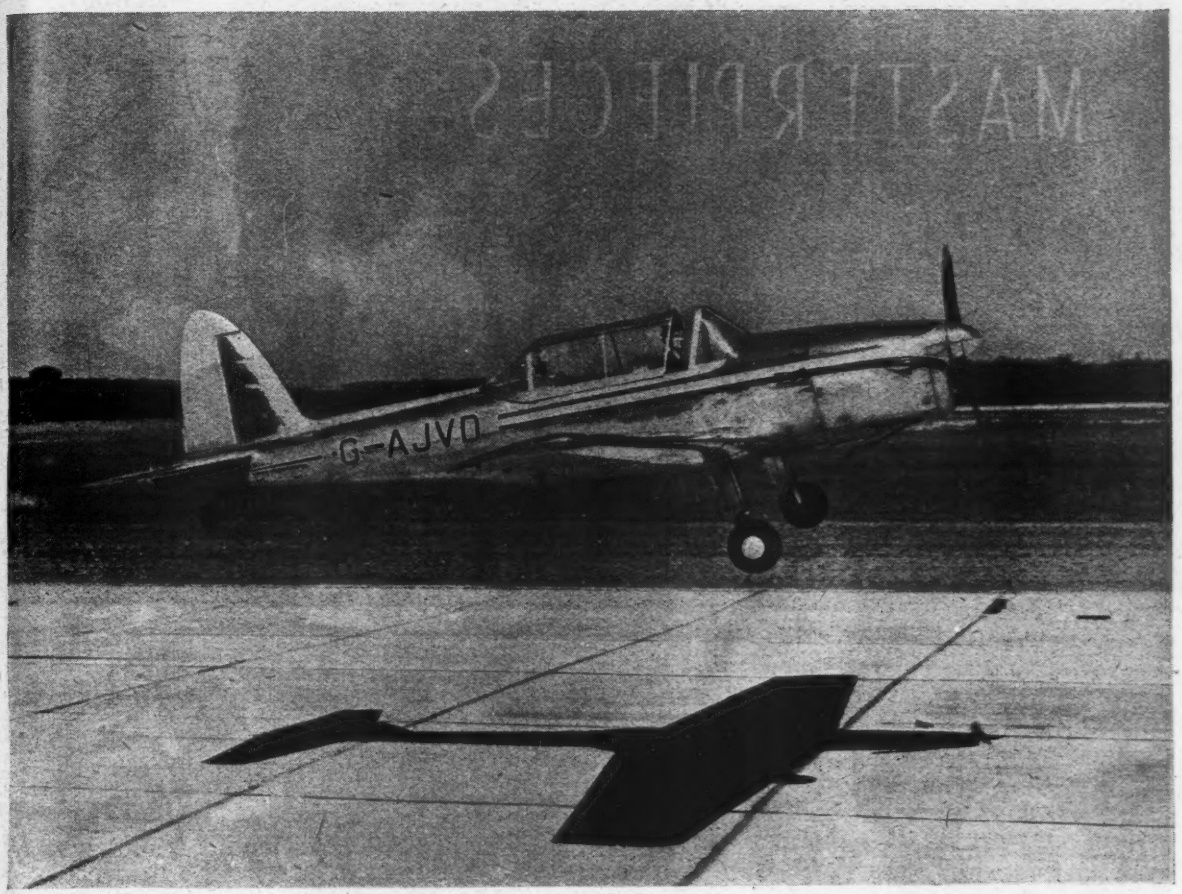
AIRLINES' COMMITTEE

B.O.A.C., B.E.A. and B.S.A.A. have decided to pool their views on the probable development of civil aviation and to agree to common engineering standards. An Aircraft Requirements and Contracts Committee has been set up to review and report to the Airline Chairman's Committee on the aircraft replacement programme. Mr. N. E. Rowe from B.E.A. is the chairman of the Committee, and the other members are: Air Vice-Marshal Sir William Cushion and Mr. A. C. Campbell-Orde, representing B.O.A.C.; Mr. B. S. Shenstone and Group Captain J. E. V. Tyzack, representing B.E.A.; and Mr. J. W. Kenny, representing B.S.A.A.

The terms of reference are to co-ordinate and formulate new aircraft requirements on the basis of the commercial and operational programmes and estimates of the Corporations; to agree on broad specifications for new types of aircraft, power plants and ancillary equipment to secure the maximum standardization, for example, in cases where a common type of engine is installed in several types of aircraft the power plant should be made interchangeable; to assess the numbers of aircraft needed and the capital expenditure involved, and consult with the Ministry of Civil Aviation and the M.o.S. on types, numbers, delivery programmes and proposed capital expenditure. It is suggested that Project Parties should be formed with the Ministries to review specific proposals for new types of aircraft in terms of requirements and production practicability, and presentation of the Corporations' requirements to the inter-departmental Civil Aircraft Requirements Committee of the M.C.A. The Committee also intend to consult with the M.C.A. in the selection of firms to submit design studies with estimated costs of production and to examine those studies with the Project Party to ensure that all technological and other factors are fully considered, and then to recommend to Corporations on the designs submitted, having



CHARTER TO SOUTH AMERICA: The Hawker Siddeley party ready to leave London Airport by Tudor IV on Saturday last. (Left to right) Sir Frank and Lady Spriggs, Miss June Spriggs, Mrs. Brodhead, Sir Roy Dobson, Brigadier and Miss Crosland, Major A. J. P. Collins, and Mr. R. Conner.

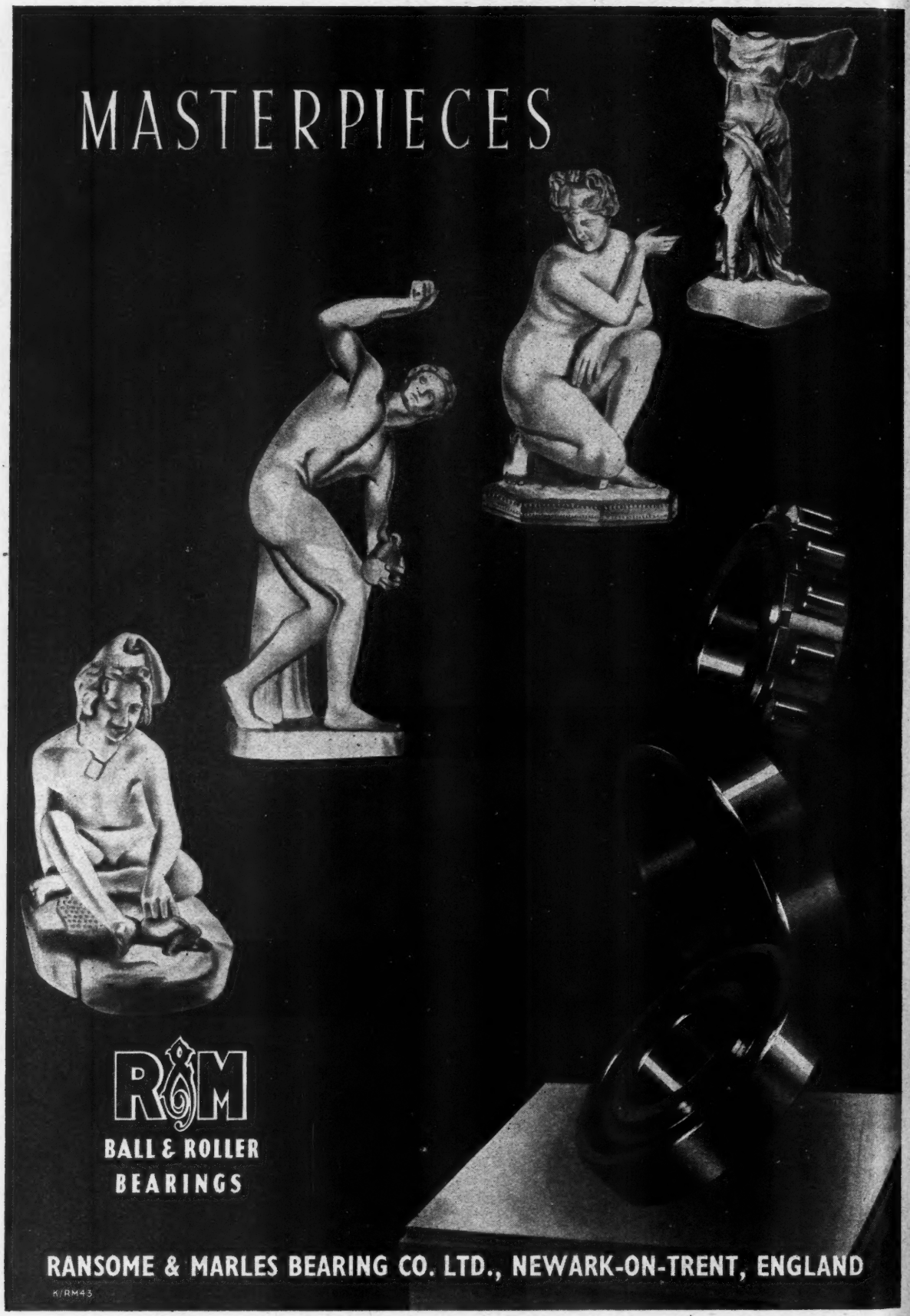


On April 14 1948, the Secretary of State for Air, answering a question in the House of Commons about future equipment for the R.A.F.V.R., said,

"The Tiger Moth will be replaced by the Chipmunk."

DE HAVILLAND CHIPMUNK

GREAT BRITAIN CANADA


MASTERPIECES
R&M
BALL & ROLLER
BEARINGS
RANSOME & MARLES BEARING CO. LTD., NEWARK-ON-TRENT, ENGLAND
K/RM43

Civil Aviation News . . . . .

regard to the estimated costs. The prototype policy to be followed is a subject to be discussed and agreed with the Ministries after the Corporations have decided on the designs to be adopted, and the Committee will be responsible for negotiating production orders on behalf of the Corporations and to co-ordinate the constractual arrangements; later to co-ordinate negotiations with manufacturers after the contract is placed, including modifications and development procedure.

RUNWAYS AT PRESTWICK

THE work of strengthening the runways, aprons and taxi tracks at Prestwick airport began on April 12th, starting with runway 14/32. While the work on this runway is in progress it will be divided longitudinally and a continuous yellow line will divide the serviceable from the unserviceable portion the latter being identified by the usual white crosses. At night the dividing line will be marked by "goose-neck" flares and the normal lighting on the unserviceable portion will be extinguished. The M.C.A. have therefore laid down that between 1100 and 1630 hours G.M.T. until May 1st and thereafter from 1100 to 1800 hours G.M.T. the use of the main runway will be restricted to aircraft having obtained special permission in specified emergencies. Pilots are requested to use the subsidiary 08/26 runway when wind considerations are favourable or to use the airfield at Heathfield in order that the work at Prestwick may continue without interruption.

STAR TIGER INQUIRY

CONDUCTED by Lord Macmillan and with Professor A. A. Hall and Captain J. W. G. James as assessors the court of inquiry into the loss of the B.S.A.A. aircraft Tudor IV opened on April 12th, and was continuing at the beginning of this week. Many witnesses have been heard, including Air Vice-Marshal D. Bennett, who has suggested sabotage might have been the cause of the accident. Legal representatives are appearing for the United States Government and the United States Civil Aeronautics Board, the Portuguese Government, the Radio Officers' Union, Rolls-Royce, B.S.A.A., the Sperry Gyroscope Company, A. V. Roe and Company, the Air Registration Board, Lady Coningham, and the relatives of ten other passengers. Watching briefs are held on behalf of the Association of Scientific Workers and the Guild of Air Pilots and Air Navigators.

ICELANDIC AIRPORT

KEFLAVIK Airport, known as Meeks Field during the war, is an important refuelling base for transatlantic aircraft when weather conditions will not permit a direct flight between the U.K. and North America. During a recent nine months aircraft belonging to A.O.A., T.C.A., B.O.A.C., K.L.M., S.A.S., Air France and Iceland Airways made 928 movements through the airport involving the handling of 16,200 passengers, 580,000 lb of cargo and 541,000 lb of mail. It is rather interesting that 2,600 of those passengers embarked in Keflavik and 4,500 flew into Iceland through the airport; the remainder were passing through. The number has increased in recent months to about 2,000 passengers and 185 aircraft a month. Apart from casual services three eastbound and four westbound services a week are operated on schedule by A.O.A. The company will increase the west bound services to five on May 15th.

P.A.W.A. CONSTELLATION CRASH

ON the morning of April 15th a Pan American Airways Constellation on a routine flight from Karachi to New York crashed on the approach to landing at Shannon at 02.15 hrs. B.S.T. At that time visibility was between 2 and 3 miles, with fog patches around the airport reducing visibility in places to about 250ft. The cloud base was given as 400ft. At the first attempt to land the aircraft overshot the runway, went round again and attemped another landing using I.L.S. When on the approach and 600 yards from the end of the runway the aircraft struck a 3ft stone wall which wrecked the undercarriage. At a point farther on the port outer engine was torn out and the petrol tanks were punctured. After skidding along the ground for a further 250 yards the aircraft came to rest and almost immediately the petrol tanks exploded and the aircraft was burnt out. Of the 26 passengers and six crew there was one survivor, who can only account for his escape by the floor opening up and allowing a sufficiently large hole through which he could crawl.

The Civil Aeronautics Board have subsequently stated that the aircraft was in normal contact by radio with the Control tower until within about a minute of the accident, and no mechanical trouble was reported.

ACCIDENT AT NUTTS CORNER

ON October 3rd a Lancastrian chartered by the Ministry of Agriculture and Fisheries from Skyways, Ltd., for transporting milk from Belfast to Speke, swung off the runway at Nutts Corner airfield when taking off, and struck the south bank of the River Cromlin; although fire broke out no lives were lost, but the pilot, who was released by the radio officer before the fire took hold, was injured; the first officer was seriously injured but managed to crawl from the wrecked fuselage to safety. At the time of the take-off visibility was between 50 and 100 yards and the pilot was assisted by instruments. In the opinion of the Chief Inspector of Accidents the cause of the mishap was that, when changing from "visual" to instruments the pilot lost directional control of his aircraft allowing it to swing off the runway and bounce into the air before full flying speed had been attained. Tests subsequently carried out have shown that the proximity of milk churns to magnetic compasses induce deviations of these instruments and it is therefore recommended that check-swings should be carried out whenever ferrous metals are stowed near magnetic compasses.

BREVITIES

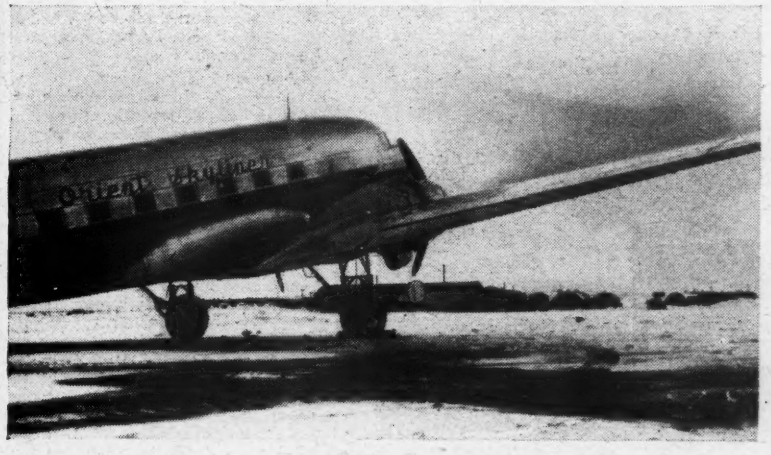
From May 15th until June 5th Aer Lingus will operate on Mondays, Thursdays and Saturdays a service between the Isle of Man and Dublin with Dakota aircraft. From June 5th there will be a daily service, including Sundays, leaving Dublin at 11 o'c. in the morning and returning from Ronaldsway at 12.15 p.m. The journey takes 40 minutes. Fares will be £3 single and £5 8s return.

* * *

North Sea Air Transport has increased its fleet of aircraft for charter purposes and has purchased three Rapides, two Aerovans, one Lockheed 14, one Lockheed 12 and an Avro XIX. The company already has four Rapides, a Proctor, a Messenger, an Auster and an Anson I. W/C. I. H. Edwards, D.F.C., has recently joined the company as sales manager with headquarters at 11, Upper Grosvenor Street, W.1.

* * *

Air Commodore W. H. Primrose has resigned from his appointment in the Ministry of Civil Aviation but will maintain his interest in helicopter development. He has been assisting Sir Frederick Bowhill, chief technical adviser to the Ministry, on special duties connected with the development and study of helicopters, freight services and the carriage of mail by air. The Air Com-



FAR FROM HOME: A Dakota belonging to Orient Airways from Calcutta, at Keflavik Airport, Iceland. In front of the terminal building in the background a B.O.A.C. Liberator is refuelling.

Civil Aviation News . . . . . .

modore's relations with the Ministry were particularly amiable, and contrary to other reports those good relations still remain.

* * *

It is understood that de-icing equipment will eventually be fitted to the S.M. 95 four-engined passenger aircraft being flown by Alitalia. The company are awaiting delivery of the necessary equipment.

* * *

Captain A. C. Gazdar, operations manager of Air-India International, was captain of the Constellation on the company's first proving flight to this country. The aircraft left Bombay on April 11th and landed in London on the 15th. Regular services will be started in June.

* * *

Mr. W. Leonard Kaye, late of Messrs. L. D. Hewett and Co., Ltd., and the United States Lines, has been appointed manager of the Birmingham branch travel department of Messrs. Hogg, Robinson and Capel-Cure, Ltd., at the new premises at 104/6, Colmore Row.

* * *

On April 24th an air display will be held at Ringway Airport, Manchester, and pilots, other than those on scheduled services, are advised to avoid flying within a radius of eight nautical miles of the airport between 1300 and 1800 hours G.M.T. This display, which will include aerobatic and glider-flying demonstrations, is sponsored by the Auxiliary Air Force Reserve Command for recruiting purposes and most of the aircraft taking part will be Service types.

* * *

Licensed aircraft engineers and owners of civil aircraft are warned in *Notice No.* 26 that the strut between the two rudder bars on Gemini and Messenger aircraft is liable to foul the first pilot's rudder controls when disconnected, should the stowage bracket fail. This strut should therefore be removed altogether when not required. In A.R.B. *Notice No.* 27 details are given of the procedure concerning the possibility of cracked spider assemblies on D.H. airscrews fitted to Viking aircraft.

* * *

Notice to Airmen No. 135 of 1948 gives details of examinations in London and Liverpool for civil aircraft radio operators' certificates of competency/licences, and also the dates for last acceptances of applications.

* * *

Member companies of I.A.T.A. have been requested by the association to operate at least 1,500 feet over East Africa in order to avoid frightening elephants and other wild game. With the vastly increased number of aircraft this nuisance has recently become serious.

* * *

Under Norway's hundred million kroner (five million pounds sterling) Defence Plan the purchase of jet aircraft will be given priority. The air raid warning and observation system is to be improved and refresher courses for all services and reserves have been arranged for the coming spring and summer.

* * *

There have been many meetings in Scotland to protest against the dismissal of Captain E. E. Fresson, of B.E.A. Sir Archibald Sinclair, Lord Lieutenant of Caithness, subscribed his name to a list of objectors, and Mr. Walter Elliot, M.P., in a letter wrote: "To sack those who can fly and retain those who can talk may encourage parrots, but it is a poor way to develop eagles." At a meeting in Inverness it was contended that air services in the northern area of Scotland had deteriorated, and a full statement on the management and future policy of B.E.A. as it affected the Highlands, and the reinstatement or adequate compensation for Captain Fresson were demanded.

FROM THE CLUBS

In the second year of its operation at Bridlington airfield the East Riding Flying Club has increased its membership to 150. Since the beginning of the year one member has successfully completed an instructor's course and seven new A licences have been obtained; three more pupils are ready to complete their A licence tests and two are ready to take the commercial pilot's examination. During March 72 hours were flown and there is every indication of a steady increase as the summer season comes along. The fleet consists of Auster and Tiger Moth aircraft and the rates are £3 per hour, reduced to £2 5s per hour for contract block flying.

* * *

The Oxford Aeroplane Club has increased its membership considerably since the beginning of 1948 and is confident that last year's figures will be easily exceeded. During term-time, many more undergraduates are learning to fly and the contract block scheme is proving very popular; several new members have contracted to take blocks of 50 hours. Notwithstanding restrictions and lack of government assistance the club does not intend to close down but rather expects a busy season. An Auster has been added to the fleet of Tiger Moths and is included in the contract flying scheme which provides flying at £1 15s per hour on the 100-hour block. On May 13th, 14th and 15th the Oxfordshire County Agricultural Society are holding their annual show at the aerodrome, which will be open as usual to welcome private owners and visitors from other clubs who may land without permit or charge.

* * *

Members of the London Aeroplane Club flew 70 hours in the last week of March bringing their total for that month up to 193 hours, 25 minutes. The club is flying a "Dawn Patrol" on Sunday, June 6th, and cordially invites visitors to attempt to land at Panshanger Airfield without having the registration of their aircraft noted by the defenders during the "alarm" period. Those who successfully evade the defenders will be entitled to the traditional free breakfast which, it is hoped, will be sufficiently lavish to make visitors feel their sortie was worth while. Neighbouring clubs will receive official invitations stating the time of the operation, and others who are interested can obtain information from the Secretary, London Aeroplane Club, Nr. Panshanger, Herts. Telephone Essendon 305.

* * *

To be eligible for membership of the Handlebars Club, recently formed by W. J. Hooper, better known as *Raff* the cartoonist, and Jimmy Edwards the comedian, applicants must be able to boast moustaches of at least 4½ inches span when at rest and 5½ inches "agrin." The extremities must be "graspable." The members enjoy insurance cover against fire risks and nocturnal removal of moustaches by "Delilah wives." The president of the club is Raymond Glendenning the well known commentator. W. J. Hooper has compiled a complete history of the moustache which will be published in about a month entitled: "You Can't Laugh it Off." If it is anything like as amusing as "Prune's Progress" its appearance will be eagerly awaited by many. Those wishing to be "measured" for membership may obtain further details from Mr. W. J. Hooper, 21a, Clarendon Street, S.W.1.

***TIPSY TEST:** After its first air test, in the hands of G/C. Gordon Slade, Fairey's chief test pilot, an Avions Fairey Tipsy B is the centre of interest at White Waltham, where it is to be handed over to the Fairey Flying Club.*

DE HAVILLAND

VAMPIRE — Fighter

GHOST — Turbine

International Altitude Record

(Subject to official confirmation)

18133 m. — 59,492 ft.

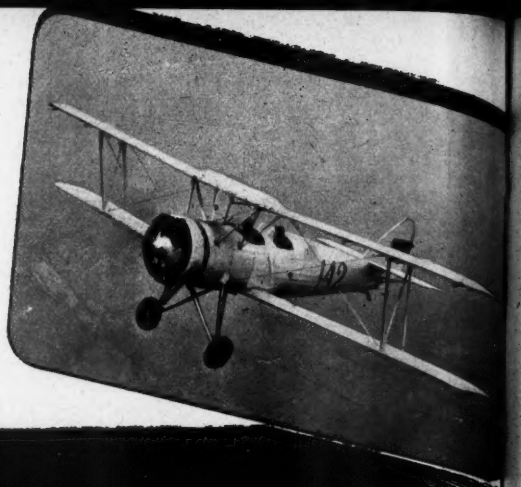
D H AIRCRAFT

D H ENGINES

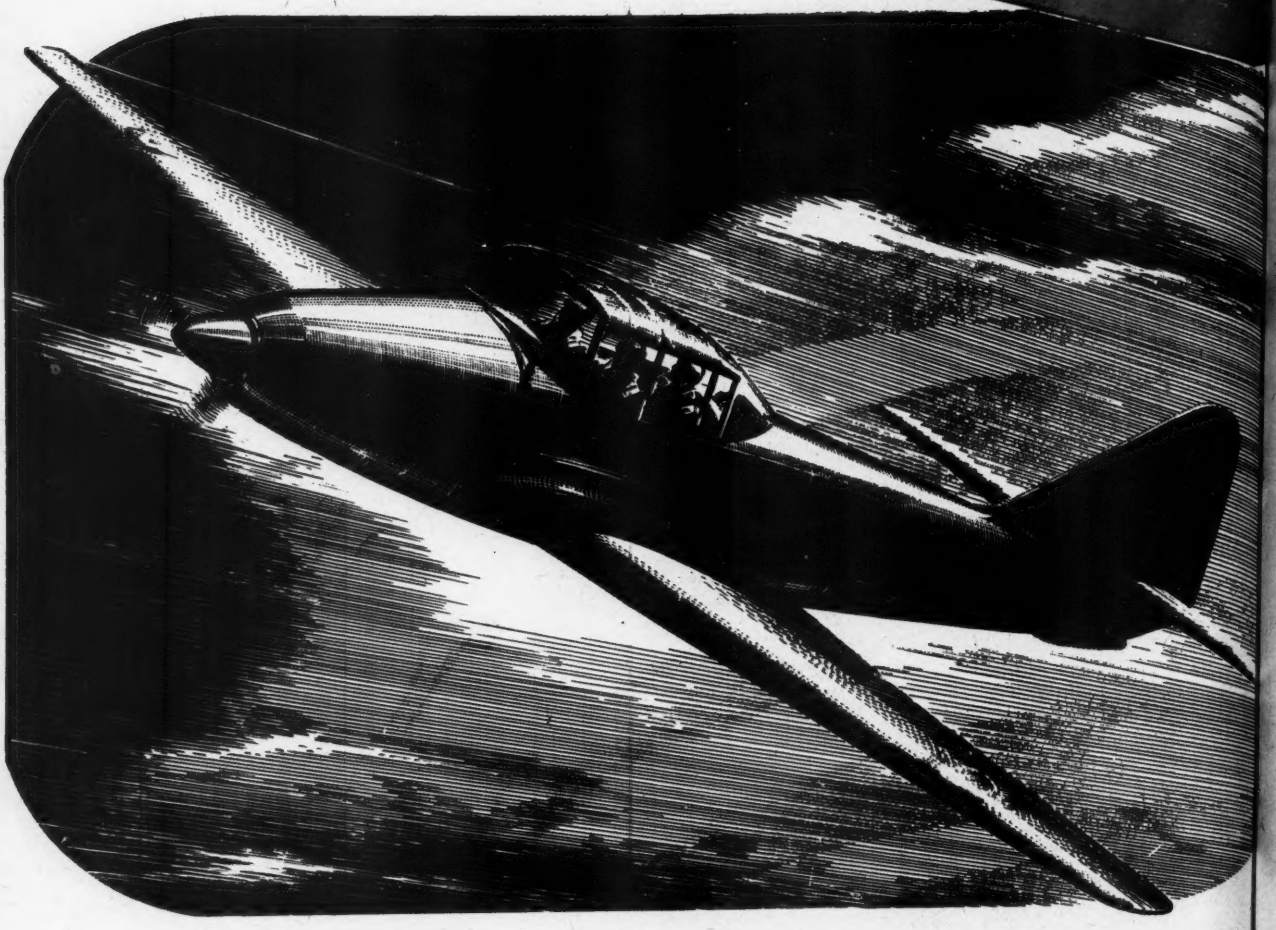
No. 6

Flight, April 22nd, 1948

Do you remember ?



Out of the Avro Tutor grew the Avro 626, shown here—the first 'general purpose' trainer, designed to cover not only flying training but instruction in navigation, radio operation, gunnery, bombing, and photography, all over the world.

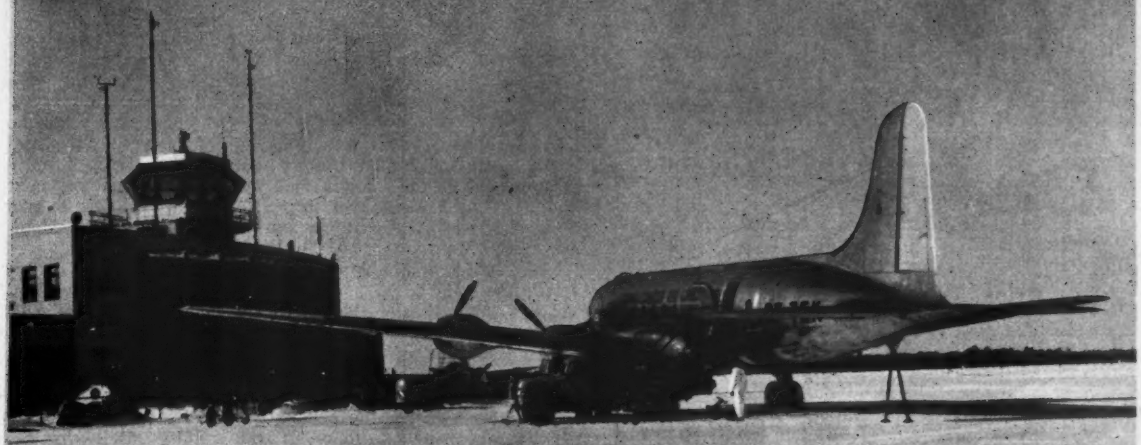


and now — the Avro Athena trainer

Out of Avro's trainer experience, from 1912 onwards, comes the new conception of post-war trainer—the Avro Athena, built to an exacting specification. Here is the sum of all that Avro have learnt in teaching a world to fly. There are alternative types the Mark I with a propeller turbine Armstrong Siddeley Mamba or Rolls-Royce Dart, and the Mark II with its Merlin 35.

A. V. ROE & COMPANY LIMITED

MANCHESTER (*Branch of Hawker Siddeley Aviation*)



A Mark I North Star loading up at Dorval.

Trans Canada with T.C.A.

A Personal Experience of Domestic Operation in Eastern Canada

By Roy Pearl

MONTREAL was chilly, there was a thick layer of snow outside the town, and the wind was bitingly cold. Weather farther west was much worse, blizzards and even lower temperatures were reported, but that was normal for the time of year, and a flight to Winnipeg through the eastern airports with T.C.A. under such conditions seemed to be an ideal way of seeing aviation in Canada.

The Montreal-Vancouver service is but one of eighty-five flown each day within Canada by Trans-Canada Airlines. Flight number 5 leaves Montreal at 1315 hrs, the second of the four services westbound to Vancouver which leave daily, and as we were finishing a delicious snack lunch of ham and eggs in the restaurant overlooking the sunny but cold tarmac, the tannoy suggested that we should prepare to leave. Several of us made our way out of the hot and busy eating place leaving behind a room full of air travellers. I mean air travellers, because they were so obviously air-minded but not air-travel conscious. There was no adventure in their minds, such as I venture to suggest still exists with so many passengers at Northolt and London Airport. Such is the standing of aviation in Canada.

First stop Ottawa, only one hour out in the Dakota, and there we landed to off-load a few and take on other passengers. The airport is some distance from the town, and the temporary buildings which adjoin a hangar are small, surprisingly so, bearing in mind the importance of the city and the fourteen through services daily by T.C.A. alone.

Toronto was of considerable interest, since Malton airport is undergoing development, and it is from that airfield that the Canadian Avro C102 jet airliner will first fly—it is hoped in the spring of 1949. At present there are two runways of 1,400 yds and a third just 100 yds shorter, but extensions are possible into the surrounding flat country. Malton is seventeen miles from Toronto city, and the road passes through flat undeveloped country, but the site was chosen at such a distance to allow expansion of the city without interference. Routes converge upon Malton from Montreal and Ottawa, from the north and from the west, from Chicago and Detroit, Cleveland and New York, and about 800 scheduled services by Trans-Canada Airlines, American Airlines and Trans-Ocean Airlines pass through each month. Non-scheduled, local, itinerant and R.C.A.F. movements add up to make a monthly total of more than eleven hundred movements, more than at London Airport or Northolt, but passenger traffic is about the same. Passenger handling takes place in one temporary wooden building, but the tarmac is being widened, and spacious, modern, permanent buildings have been planned and are in fact already under construction. I.L.S. is also being installed. Here again, as at Montreal, the airport was an air station, and in the terminal there was no unusual atmosphere, no fuss—there was a business going on.

From Toronto the T.C.A. route turns north-west, and after about 125 miles it crosses the narrowest stretch of Lake Huron to the islands in the North Channel, where it again turns west to Sault Ste. Marie. Light was failing as we approached the string of islands, but we were able to see pack ice on the lake and the solid ice around the shores of the islands and on the frozen rivers. In that country of "magnificent distances," very versatile aircraft are necessary for all-the-year-round private owner and feeder line use. We landed in the dark at Sault Ste. Marie, which lies within the United States. That complication could lead to untold difficulties, but apart from a

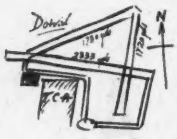
Passengers making for the nissen hut at Sault Ste. Marie.

Trans Canada with T.C.A. . . .

Customs officer and an American policeman we would not have known we were outside Canada. A large nissen hut, cunningly modified, is the only passenger handling building, and there is little space for the necessary formalities for those passengers going into town.

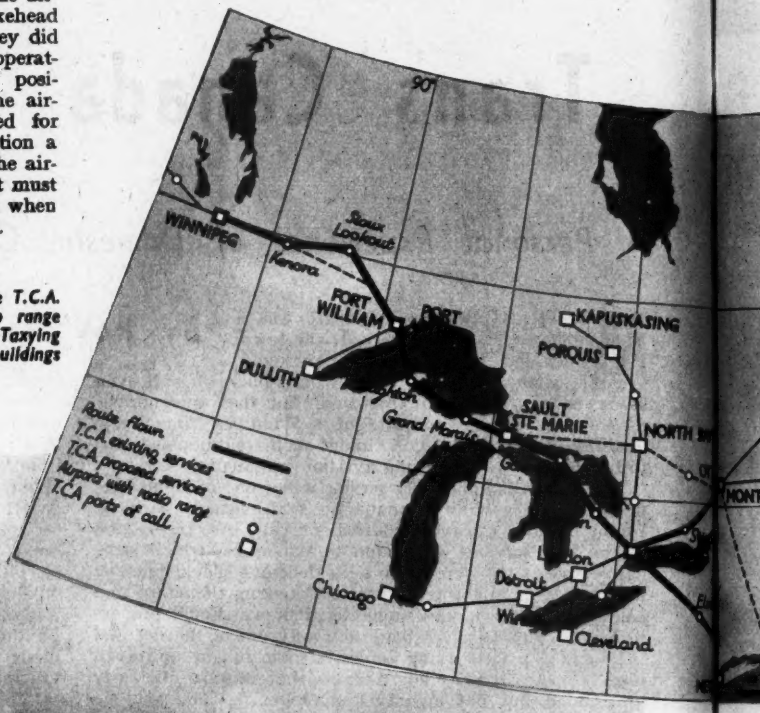
From a glance at the map it will be seen that long over-water stretches are avoided by the T.C.A. Dakotas by flying along the Radio-Range corridors. A dog-leg is flown on each stage, a slightly uneconomic procedure perhaps, but one giving greater emergency facilities, and convenience for establishing a straightforward Radio-Range network.

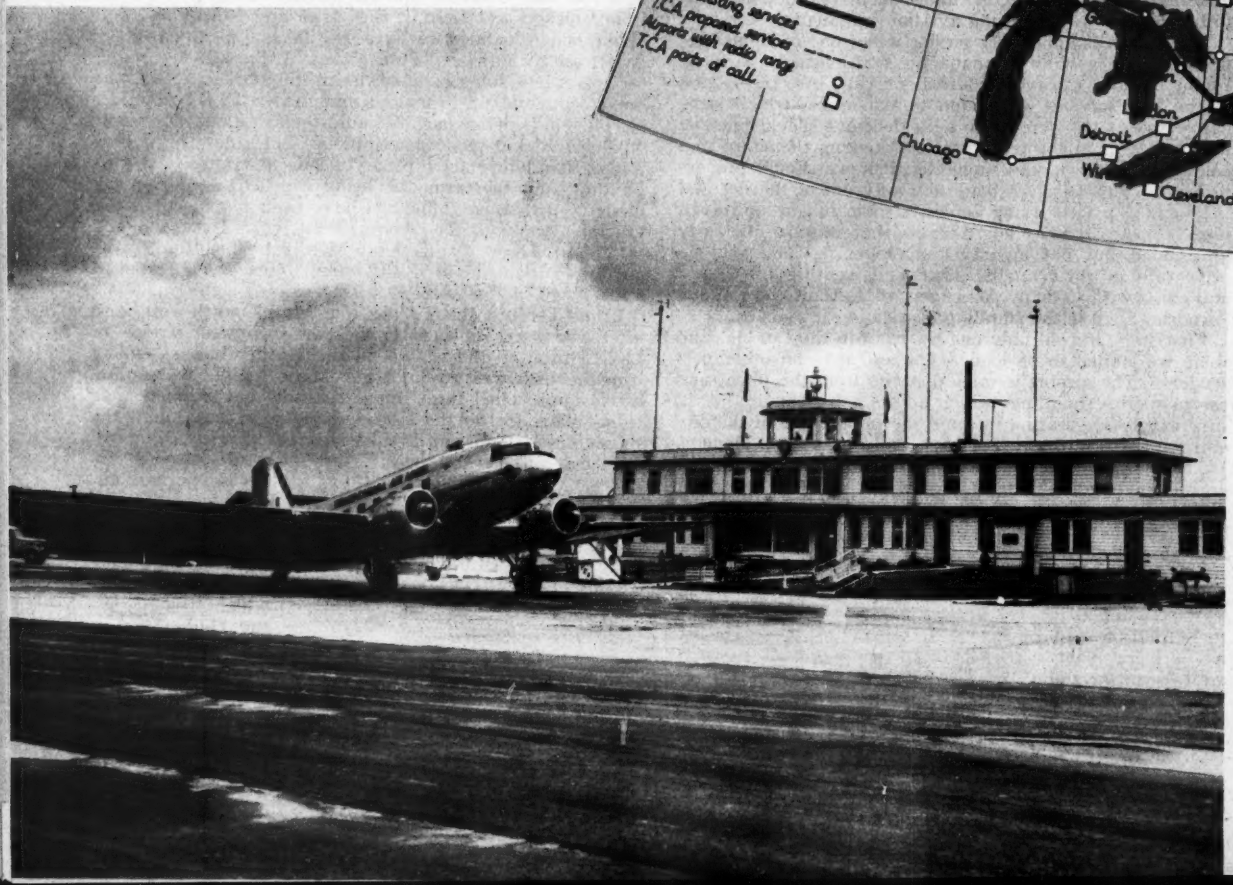
By the time we had reached Fort William-Port Arthur, known to the crews as Lakehead, we were accustomed to the 2-hour to 2½-hour stages and I found them pleasant and not in the least boring, even though the whole landscape was snow-covered and almost without relief. Snow was falling fast as we landed beside the hill, well defined by red obstruction lights, which rises to 1,000ft from the boundary of the airfield. Only as we landed at Lakehead in daylight on the return journey did I appreciate the difficulties of operating into that airfield. In a position 3.2 miles south-west of the airfield, the Radio-Range is used for homing at a safe height, and from the Range station a descent at 1,000 ft per min is made to 500ft over the airfield. The minima are strictly observed and contact must be possible over the airfield at not less than 1,000ft when landing on the 300-deg runway nearest to the hill.



We had a bumpy flight through blizzards to Winnipeg, straps on, and we climbed up through the weather to about 12,000ft, collecting a fair amount of ice on the way. We changed over to Central Standard Time after leaving Lakehead at 9.20 p.m., and although the flight took 2 hrs 40 mins we had made up one hour and landed at 11 p.m. local time, with the temperature at 24 deg. below zero. Twenty minutes later the Dakota took off without us on the next stage west to Vancouver through those attractively named airports Regina, Swift Current, Medicine Hat and Lethbridge, to arrive at 5.55 a.m. the next day.

We had flown halfway across Canada, more than twelve hundred miles in 8¾ hours in easy stages, and we were not tired. The T.C.A. Dakotas are pleasingly furnished and decorated, and the silencing is particularly effective; the service in the air was excellent, the food was good and we were not periodically embarrassed by an equally embarrassed captain trying to make interesting conversation about his own routine occupation—a practice of doubtful worth on British airlines. If the captain likes doing it—





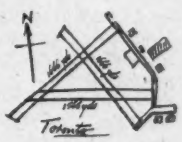
ON the specially drawn map in the centre are shown the T.C.A. routes over Eastern Canada, and the numerous radio range stations with which aircraft are in constant touch. (Below). Taxying out from the tarmac at Malton Airport, Toronto. Permanent buildings are under construction.

The tarmac at Stevenson Field, Winnipeg, with the vast T.C.A. maintenance buildings in the background. Passengers leave the terminal building, adjoining the gable-roofed hangar, to board a Mark I North Star while a Lodestar and Dakota taxi up to the tarmac.

certainly, let him visit his passengers, but I think few captains enjoy it, and few passengers really think it necessary. On the door leading to the crew's quarters, however, T.C.A. insert the names of captain, first officer, and stewardess, a personal touch which does not embarrass nor offend.

At Winnipeg, T.C.A. has its headquarters and a vast maintenance base. The large hangars and buildings consequently create a somewhat false impression of the importance of Winnipeg as an airport. During the winter the monthly average is about 5,000 passengers passing through on the transcontinental and Edmonton routes. The airport buildings are rather similar to those at Ottawa and although adequate at present, extensions will be necessary for future traffic.

In a recent message to the staff of T.C.A., the new president of the company, Mr. C. R. McGregor, said that during 1948 T.C.A. would shoulder the burden of a fleet of aircraft at a cost exceeding the total of its previous capital expenditure, and it might be called upon to operate domestic and overseas services which treble its present load capacity. Behind that message lies the appreciation that civil aviation is an integral part of the development of Canada. Important centres are scattered over the vast country, and aircraft must take an active part in shortening the time of travel between the rapidly expanding cities and over the extended communications to areas of commercial development. In 1947 more than 16,250,000 miles were flown, passenger traffic increased over the previous year by 50 per cent. and cargo traffic by 35 per cent. On domestic services alone 400,000 passengers, 2½ million pounds of mail, and 1½ million pounds of cargo were carried. The T.C.A. fleet now consists of 30 Dakotas, five Mk. I North Stars, and about 15 of the 20 Mk. IIs on order from Canadair. A number of Lodestars are still in operation, but are slowly being replaced. On June 1st, T.C.A. will start transcontinental services with North Star Mk. IIs. The Dakotas will continue along the routes, stopping at intermediate airports as now, but the Mk. II DC-4Ms with pressurized cabins will fly from Montreal to Vancouver twice a day in ten hours, stopping only at Toronto, Winnipeg and Calgary. Two North Stars a day will fly on the Toronto-Chicago route, and three services will be scheduled to fly between Toronto and New York—the route with the heaviest traffic in the entire T.C.A. system.

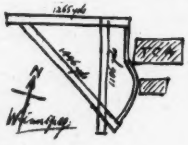


Australia and Canada have agreed that there will be

(Above) The spacious comfort which North Star passengers will enjoy on the Trans-Canada express services. On the right one of the pressurized DC-4Ms is seen over Montreal airport.

Trans Canada with T.C.A. . . .

room for airlines of both countries over the trans-Pacific routes, but traffic volume does not warrant services by T.C.A. at the present stage; as Mr. McGregor pointed out, however, the time may not be far distant when routes through the Aleutian Islands may be opened. The present operations to Japan are only temporary.



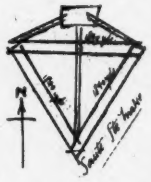
T.C.A. technicians were particularly enthusiastic about their Rolls-Royce power plants, which after some initial troubles are now highly satisfactory. As well as finding few deficiencies in the power plants, T.C.A. has received great benefit in assistance from the manufacturers. The new Merlin 624 will have three-bladed airscrews and 1,760 h.p. for take-off. Cold-weather testing up to 32,000ft at −82 deg F has proved its reliability. Our tour of the headquarters was made almost at the double owing to time restrictions, but we were able to see the vast works organization. The heated hangars, stores, instrument-testing shops, power plant assembly shops, the airframe and engine repair sections would be, could they see them, the envy of the British Corporations.

Snow-clearance teams had been at work the next morning when we arrived for our take-off at nine o'clock. The 7.40 service had already left for Vancouver, where ground temperature was +72 deg F, whereas at time of take-off from Winnipeg air temperature was −42 deg F. Snow clearance is an expensive item. At Dorval, Montreal, 280 men are employed for airfield maintenance, and in winter they are engaged largely upon clearing snow from the runways and twenty miles of road and tarmac. An enormous Walter snowfighter, costing 51,000 dollars, four Secar ploughs, graders for scraping, two medium ploughs and 15 small one-way ploughs go into action when snow falls, and, incidentally, 8,000 tons of coal are required each winter for heating the airport buildings.

The Dakotas are flown by two pilots, carry no automatic pilot, and a stewardess completes the crew. Navigation is not necessary since all flying is done on the Radio Range, and no W/T is carried. The company is allocated eight H.F. and two V.H.F. frequencies and all aircraft are in touch by R/T whilst airborne, the range being about 100 miles at 8,000 feet and reception is normally clear and distinct.

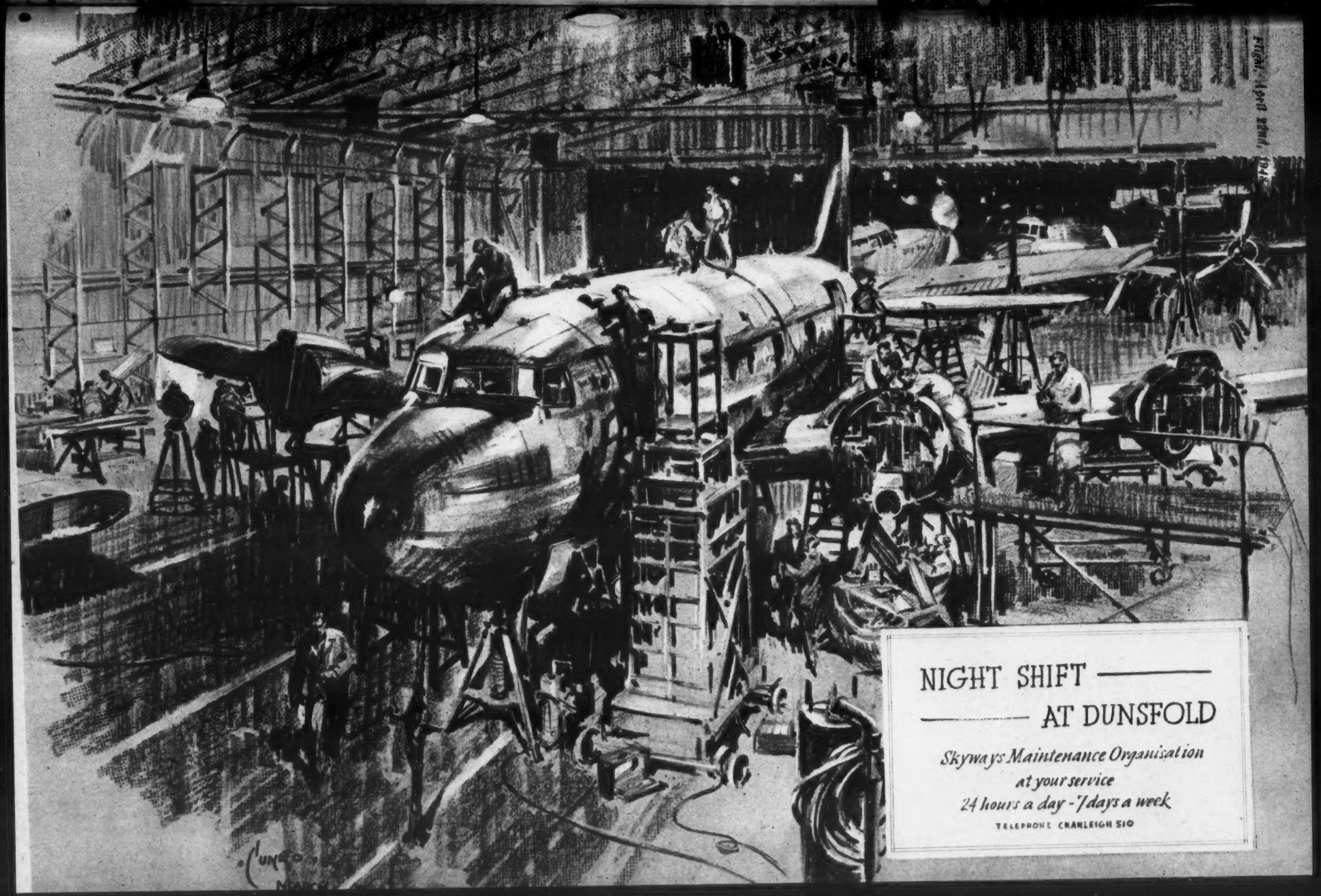
Airports in Eastern Canada are being developed, but passenger handling services are handicapped by temporary accommodation. The runways, flying facilities, airways and communications are good, however, and the Department of Transport and T.C.A. co-operate in planning, improving and enlarging airports and airways systems.

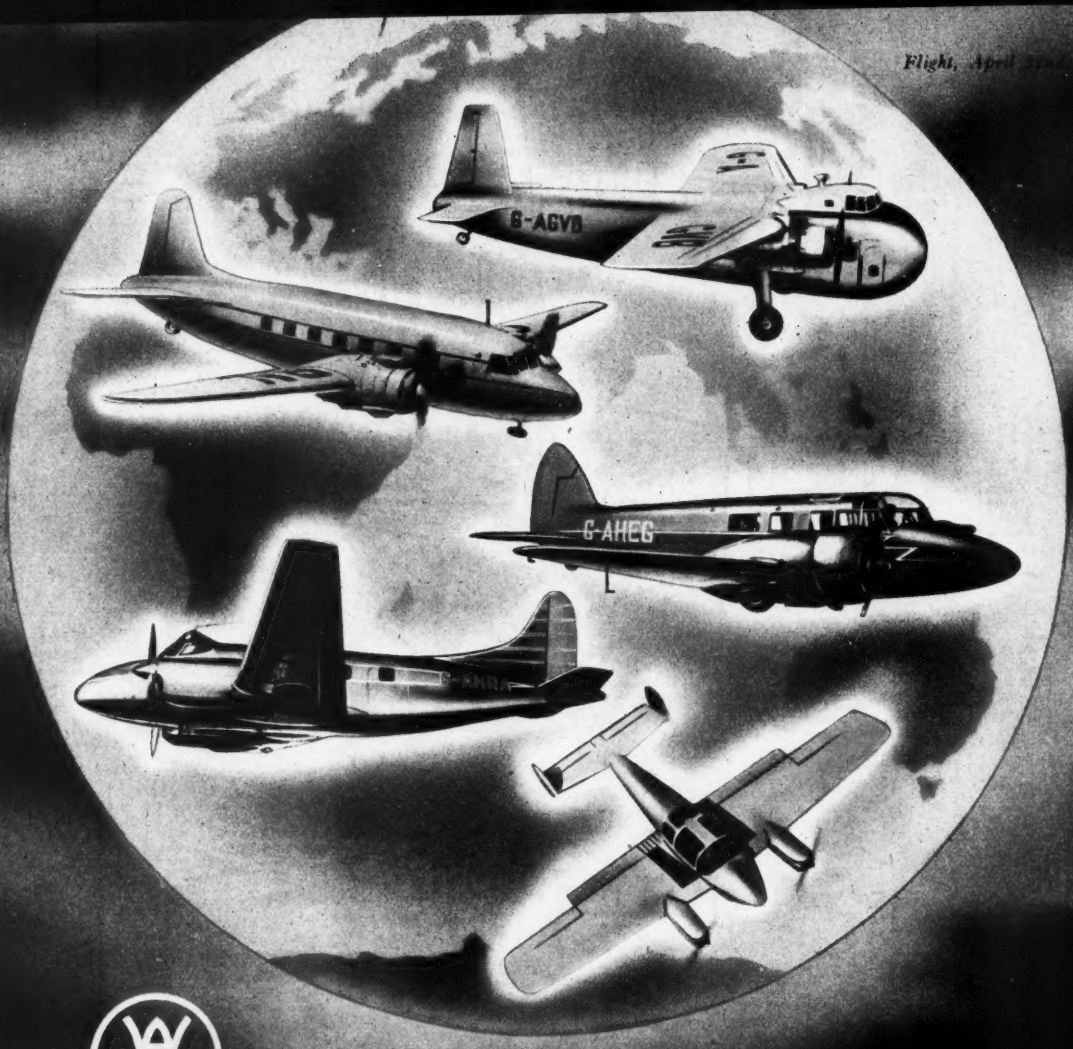
On each leg in both directions our aircraft were loaded to capacity—an indication of good service and an air-minded nation.



Sir William Hildred, director-general of I.A.T.A., proclaimed recently that T.C.A. had done well to appoint Mr. Gordon McGregor as president of the airline in succession to Mr. H. J. Symington who retired last November. "To find a man," he said, "young and active and internationally minded, with a brilliant pilot's record in the war, is a great thing." There is every indication that he was very right when he declared further that so far as looking ahead was concerned, T.C.A. had nothing to worry about.

Lakehead airport has an up-to-date but small terminal building. The hill in the background is 1,000ft high.


NIGHT SHIFT
AT DUNSFOLD
Skyways Maintenance Organisation
at your service
24 hours a day - 7 days a week
TELEPHONE CRANLEIGH 510



AIRWORK LIMITED *Sales Division . . .*

Incomparably the biggest sales organisation of its kind in the world, AIRWORK Limited had already achieved pre-eminence in pre-war days. The Company has unrivalled facilities for, and experience in, arranging the purchase or sale of new and second-hand aircraft, whether a single aeroplane or an entire fleet. Further, it negotiates the disposal, or part exchange, of used aircraft. For every type of transaction, hire purchase facilities can be arranged at favourable rates. Due to the Company's policy of dealing exclusively with the products of no single manufacturer, AIRWORK Limited is free to offer unbiased advice on the best aircraft for specific purposes.

THE SERVICES OF AIRWORK

- Air Transport Contracting
- Servicing and Maintenance of Aircraft
- Sale and Purchase of Aircraft
- Operation and Management of Flying Schools and Clubs
- Contract Charter Flying
- Overhaul and Modification of Aircraft
- Specialised Aerodrome Catering
- Insurance

AIRWORK LIMITED · 15 CHESTERFIELD STREET · LONDON · W.1 · TEL: GROSVENOR 4841

Also at: Gatwick Airport, Horley, Surrey. Blackbushe Airport, Nr. Camberley, Surrey. Langley Aerodrome, Bucks. Heston Airport, Middlesex. Loughborough Aerodrome, Dishley, Leics. Perth Aerodrome, Perthshire. Renfrew Airport, Renfrewshire.

Casual Commentary

Why Build Non-competitive Civil Aircraft? We Must Produce World-beaters or Nothing: The Problem of the Orphans: Dr. Pangloss Versus Cold Fact

By ROBERT CARLING

I STILL find it impossible to understand where we imagine we may be going in our civil aviation future. The aircraft industry, like many others, has the toughest five years ahead of it, yet we seem to have no clearly defined and really worthwhile objectives. Indeed, the newest specifications, for 1950-plus piston-engined transports, show no appreciable advance in performance on that of the larger American civil aircraft which are already in service.

Let us be quite clear in our minds. There may possibly have been some object in going into production with a series of non-competitive interim types to tide us over the difficult post-war period, but there is absolutely no point in producing (at enormous expense to the taxpayer) any indifferent aircraft for the post-interim period. I am not in favour of buying American civil aircraft unless we must, but it will be less wasteful to do so than to use our productive capacity to make big aircraft which have no real export prospects. And any aircraft planned for airline service five years hence with a standard of expected performance actually inferior to that already available in existing American types can hardly be considered to have export prospects—or, indeed, prospects of any kind. It is just plain silly so to waste our money.

The British aircraft industry and its designers have produced world-beaters in the past; surely they are not going to sit back now and say that the best they can do is to make "adequate" aircraft for use on parochial services. The only designs worth proceeding with are those which show a clear and formidable improvement on anything at present either in the sky or likely to become airborne during the next five years. If we are not going to make civil aircraft which are at least prospective world-beaters we might just as well pack up the whole endeavour and turn our attention to something simple, like aluminium frying-pans or pressed-dural bathtubs. Judging from the appearance of things generally I begin to doubt whether we have the enterprise necessary to make frying-pans which are not both expensive and inefficient in comparison with those produced by industrialized Hottentots, and whether it would not be better for us to turn our faces to the wall now and to get it over quietly.

Beneficent Dictatorships

Somebody once said that the only committee from which results could be expected was a two-member affair—with one of the members unavoidably detained elsewhere. Let us not exaggerate. It *is* possible to obtain results from a committee of two, three, or even more members if the chairman knows exactly what he wants and takes complete charge of the meeting, drowning all trivial opposition with the usual: ". . . . Well, gentlemen, I think the feeling of the meeting is . . . ." But we in this country are committee-ridden, and, though democracy is all very well when looking after general and human issues, it does not work very satisfactorily in matters requiring expert knowledge and experience. I should like to see fewer woolly committees and more simple decisions, for better or worse, by those directly concerned.

Many months ago I counted out aloud in this column the number of orphan and near-orphan civil aircraft which littered our future path. Since then there has been very little change.

On the credit side, one of the orphans has been provisionally adopted and is now, I imagine, the unhappy subject of a triangular contest between the operator (who very naturally wants the moon for sixpence), the Ministry of Supply (which, equally naturally, does not want to pay out too many pennies for further development), and the manufacturer (who continues, nevertheless, to develop the prototype in a kind of economic limbo, while negotiating madly with fifteen people at once).

On the debit side, another of the orphans has since given up the uneven struggle, while specifications for two more prospective orphans, the M.R.E. and L.R.E. types, have been bandied about. The first is confidently alluded to in various quarters as "B.O.A.C.'s M.R.E.," but I have yet to meet anybody in the Corporation who will firmly accept responsibility for either of them. I should have thought that B.O.A.C. already had a sufficient number of types under way and would be looking forward to a day when almost complete standardization would be possible with aircraft which could reasonably be viewed as ten-year operating prospects. However, that is all a matter for the more distant future—unless there is a remarkable *volte face* in official procedure and the M.R.E.s and L.R.E.s are ordered in imposing quantities straight off the drawing-board.

Despite Official Backing

In the meantime, were it not for the fact that the practical development of two or three civil transports in the medium-large class has been possible in spite of the lack of, rather than because of, official backing, we should so far have had very little to which to look forward in the early fifties. The aircraft of which I am thinking are not private ventures in the strict sense of the word, but they might have inevitably been stillborn orphans if the manufacturers concerned had not taken a very considerable financial risk.

These aircraft, showing as they do some reasonable prospect of a brilliant future, will still require, for their full development and production, the kind of effort which has so far only been seen under the stimulus of war. They are likely to continue to be the toughest of tough propositions, and no wishful thinking, optimistic tub-thumping, or jolly organized Pangloss press parties are going to make a ha'porth of difference in their ultimate success or otherwise. All that the sponsors need is a little realistic thinking from the best-of-all-possible-worlders, and implied permission to get on with it while suffering as little as possible from any future vacillations in policy.

ASSOCIATED ILIFFE TECHNICAL BOOKS

"FLIGHT" HANDBOOK A Manual of Aeronautical Theory and Practice, 4th edition 7s. 6d. (By post 7s. 10d.)
GAS TURBINES AND JET PROPULSION FOR AIRCRAFT by G. Geoffrey Smith, M.B.E., 4th edition, 3rd impression 12s. 6d. (By post 13s.)
WALL DIAGRAMS: Rolls-Royce Derwent, De Havilland Goblin II, Metrovick F/3 Gas Turbine 4s. each. (By post 4s. 4d. each)
TURBINES FOR AIRCRAFT (4-page colour leaflet reprinted from "Flight") 6d. (By post 7½d.)
HANDBOOK OF INDUSTRIAL ELECTROPLATING E. A. Ollard, A.R.C.S., F.R.I.C., F.I.M., and E. B. Smith 15s. (By post 15s. 8d.)

From all leading booksellers or from Iliffe and Sons Ltd., Dorset House, Stamford Street, London, S.E.1.

HERE AND THERE

Copenhagen Aero Show

DENMARK has decided to hold an international aero show (the third) in Copenhagen this year. Not to be confused with the general British exhibition, the aero show will be held in the Forum, Copenhagen, from October 15th to October 24th. In view of the growing importance of the Scandinavian countries as customers, it is to be hoped that many British firms will exhibit, although the fact that the show comes so soon after the S.B.A.C. show at Farnborough (September 7th to 12th) may be something of an inconvenience. The Copenhagen exhibition is being organized by the Royal Danish Aeronautical Society, and full particulars can be obtained from the General Commissioner, Capt. John Foltman, 59, Raadhuspladsen, Copenhagen V. Stand prices are, at the present rate of exchange, approximately 12s. 10s and 8s per sq ft.

PERCIVAL APPOINTMENT: W/C. H. P. Powell, A.F.C., A.R.Ae.S., who has been appointed Chief/Test Pilot to Percival Aircraft Ltd.

Models at Cricklewood

ON Saturday, April 10th, the Handley Page Model Engineering Society held their annual exhibition. Naturally enough, the larger proportion of models on show were aircraft, but with one exception, a very fine powered model of a Lysander, the models of highest quality were found in other sections of the exhibition. Although it is, perhaps, invidious to single out one particular model for mention, the exquisite model of a 6in naval gun which actually fires 0.22 ammunition, was enormously impressive.

S.L.A.E. Meeting

THE fifth annual general meeting of the Society of Licensed Aircraft Engineers will be held on May 1st at Manson House, Portland Place, W.1, at 3 p.m. Lord Nathan will speak at 6 p.m.

A CHRISTENING CEREMONY. The Mayoress of Southampton names a Solent flying boat "Southampton" on the occasion of the opening of B.O.A.C.'s new marine terminal. The ceremony is reported on p. 449.

Testing of the XC-99

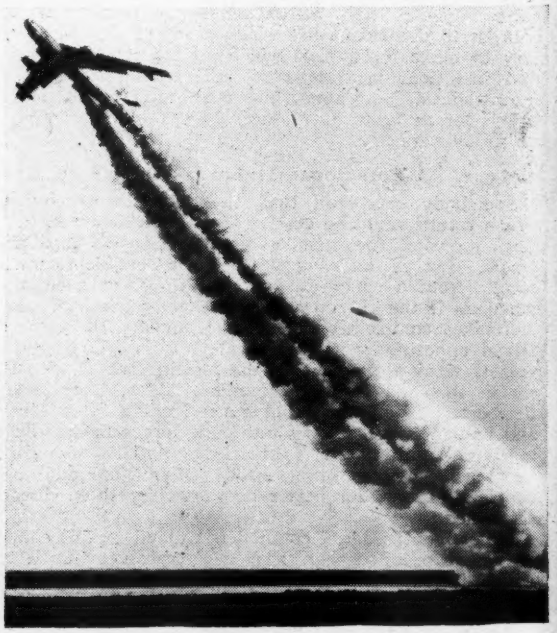
THE world's largest air transport, the Consolidated Vultee XC-99 recently reached a height of 22,000 feet, on a test flight lasting three hours and 20 minutes. According to the makers, its maximum ceiling is expected to be 30,000 feet.

A.T.A. Meeting

THE A.T.A. Association held a meeting and reunion at White Waltham on Saturday evening, April 10th. Among the officers of the Association Mr. Gerard d'Erlanger, C.B.E., remains Commodore, and Miss Margot Wyndham-Gore, O.B.E., was elected as the new Vice-Commodore. During the war she was a member of the W.A.A.F. and was Officer Commanding No. 15 Ferry Pool at Hamble. Mr. H. C. Mason, M.B.E., was re-elected chairman and Mr. S. Wood, hon. treasurer.

Swiss Display

ORGANIZED by Farner Werke A.G., Grenchen, Switzerland, an international sales demonstration of aircraft combined with a rally of pilots, will be held at Grange airfield, Switzerland, from August 21st until 29th. Manufacturers will be able to display light aircraft and airliners, gliders, engines, airscrews, parachutes and accessories. Interested buyers may fly the exhibited models and test performance in the air. Details of exhibits of intending participants should be forwarded to the organizers by the end of April in reply to which full particulars of the display will be sent.



THRUST: With its eighteen built-in A.T.O. rockets, of 1,000lb thrust, supplementing the six General Electric J-35 turbojets (34,000lb total static thrust) the Boeing XB-47 Stratojet bomber gets that spring feeling. Doubtless on this occasion the machine was loaded well below its 125,000lb gross weight.

No Coupon Problem

TRANS-CANADA AIR LINES are fitting out their station managers, controllers and agents with standard suits of a semi-formal style in place of the dark-blue uniforms previously worn. These will be individually tailored in grey serge and with them will be worn

white shirts and dark ties by men, and white open-neck blouses for feminine wear. T.C.A. believe that neat and pleasing personal appearance goes hand in hand with courtesy and efficiency, and that the new dress will catch the eye of the travelling public.

M.o.S. Appointment

MR. J. W. TRURAN, Senior Handling Technical Officer at the A. and A.E.E., Boscombe Down, has been appointed Ministry of Supply West Coast representative in the U.S. He leaves for America to-day, April 22nd. Mr. Truran came to Boscombe Down from Martlesham and at the outbreak of the war joined the R.A.F. and has remained at the A. and A.E.E. ever since. He finished as a Wing Commander with the A.F.C. and at the end of the war took up his appointment of senior handling technical officer.

A.B.A.C. Ball

TICKETS for the second annual ball of the Association of British Aero Clubs, to take place at the Dorchester on Friday, April 30th, as announced in *Flight*, March 18th, are expected to be oversubscribed. The ball is in aid of a fighting fund to make private flying available to the widest possible section of the public. The organizers, Lady Daphne Straight, wife of Mr. Whitney Straight, A.B.A.C.'s chairman, and G/C. G. H. M. Miles, vice-chairman, have disclosed that one club in the London area has taken a block of 100 tickets. As the number is limited to 600, those wishing to attend should make application without delay.

Touring Guide to South Africa

AN air touring guide prepared by the private aviation division of the Federation Aeronautique Internationale, dealing with the routes from the United Kingdom to South Africa, has recently been published. It can be obtained through the Royal Aero Club Aviation Centre at Londonderry House, 19, Park Lane, London, W.1, price £1.

To anyone contemplating a flight by the east or west routes to Africa the information it contains will be invaluable. On the subject of preflight planning full details are given regarding passports, visas, *carnet du passage en douane*, fuel clearance and permits, maps, currency and health regulations, and food rations. It also contains route maps, tables of courses and distances, details of airfields and facilities, and a section on radio aids.

THE ANSWER'S A LEMON: A Bell 47-D Utility Helicopter spraying i secticide dust on a citrus grove in Texas. Helicopters are being increasingly employed for this type of work in orchards and over ground crops.

The Tudor V

A PRELIMINARY examination of the Tudor V was carried out at Manchester on April 7th, by Mr. J. W. Booth, chairman of B.S.A.A., Air Cdre. H. G. Brackley, the new chief executive and Mr. J. W. Kenny, who were very impressed with the aircraft, six of which have been ordered by B.S.A.A. for their South American routes. Designed to carry 44 passengers and a crew of five the aircraft will have a payload of 8,500lb, and a still-air range of 2,500 miles. The cruising speed is expected to be 290 m.p.h.

DUMMY RUN: The Ministry of Supply have worked out a "Standard airman" who has been made and already christened Horace; he is 6 ft. tall and weighs 200 lb. Here he is having his equipment tested in an ejector seat tower.

News in Brief

Aer Lingus will increase their cargo rates by 2d per kilo from April 18th, on their routes from Dublin to London, Liverpool, Glasgow, Manchester and Rome.

* * *

Air Marshal Wilfrid Curtis, chief of the Canadian air staff visited Filton on April 13th to inspect the Brabazon. He arrived in this country on April 11th, and is to visit R.A.F. Stations and commands during his stay.

* * *

A. Cdre. Fielden, Captain of the King's Flight, has inspected a number of New Zealand airfields which may be included in the Royal visit and has left for Australia where he has also made a tour of inspection.

* * *

Capt. A. P. W. Cane, of B.O.A.C., has recently been awarded the Master Pilot's Certificate by the M.C.A. He is Flight Captain of B.O.A.C.'s No. 2 Line, based at Hurn, operating Lancastrians and Yorks to Africa and India. He has 9,000 hours flying to his credit.

* * *

Prof. Sir John D. Cockcroft, director of the atomic energy research and development establishment at Harwell, has been awarded the James Alfred Ewing Medal by the Institution of Civil Engineers for his contributions to the science of engineering in the field of research.

* * *

The Manchester Oil Refinery, Ltd., has drawn up a scheme of reorganization involving the formation of a new holding company—Refinery (Holdings), Ltd.—which will acquire the shares of the Manchester Oil Refinery, Ltd., in exchange for its own shares. The chairman of Petrochemicals, an associated company said recently that he welcomed developments of plants producing chemicals from petroleum as an important contribution to the economic future of the country.

ACE IN THE AIR

First Impressions of the Series II Super Ace : Novel Wheel Control and Accelerator Pedal

By WING CDR. MAURICE A. SMITH, D.F.C.

IT is usually possible to get into a light aircraft and, after a single flight, to give a reasonably accurate assessment of most of its qualities. However, in the case of the Chrislea Ace, I decided that this was not feasible. While an impression can fairly be recorded after the hour and a half I spent in the air, several more hours' experience would be necessary to form a definite opinion.

The unique feature of the Ace is its wheel-control system —a patented Chrislea design. To the best of our knowledge it is nearly 38 years since such a system has been employed. In *Flight* of August 13th, 1910, the controls of the other aircraft, the Blackburn "heavy type," were described and illustrated. Ailerons were not employed at that time, and movement to the right or left of the steering column warped the mainplane to give lateral control.

Let us be clear from the start that, so far as control surfaces and their effect are concerned, the Ace is a normal three-control aircraft. The pilot is provided with a wheel resembling the steering wheel of a car on a small scale, and with this he controls the machine in all three planes. The "steering column" projects horizontally from the panel, and at its base the pilot sees what appears to be a large ball joint. There is no push-pull action on the wheel, the three movements being obtained by up-and-down motion, side-to-side motion, or turning motion of the wheel. To operate the elevators the wheel is lifted for nose down or depressed for nose up; for left rudder the wheel is pushed to the left, and for right rudder to the right; for left or right aileron the wheel is turned in the conventional manner.

Although an up-and-down movement of the wheel is substituted for the more usual in-and-out one to operate the elevators, this, in fact, feels quite natural within a few minutes of getting into the Ace. The movement that does seem strange to start with is the sideways push on the wheel for rudder operation. On the floor there are two separate brake pedals for steering on the ground, and between them a foot accelerator pedal which overrides the hand throttle to the extent of increasing engine speed from any position set on the throttle up to full throttle, if full throttle has not already been selected.

Neat Instrument Grouping

The Ace is provided with large flaps with 60 deg. angular movement, operated by a winding handle placed forward in the roof, and with powerful trimmers for elevator and rudder. The trimmers are operated by levers moved fore and aft horizontally and positioned one on each side of the central throttle and mixture control quadrant. The flap-lowering winder, which is very smooth in operation, is above the double-curvature windscreen. Exceptionally neat grouping of instruments and arrangement of controls is one of the best features of the Ace.

The average pilot of normal experience, if such a being exists, would probably be able to fly the Ace without a dual check, provided the system was carefully explained to him and he was fully briefed before take-off. The take-off itself, under such circumstances, would almost certainly be rather erratic, though not necessarily dangerous, and once airborne he would settle down to normal flying with reasonable accuracy in half an hour or so. The approach and landing would also no doubt be on the rough side, and the exceptional power of the Goodyear

(Below) The appearance of the Series II Super Ace is a considerable improvement upon the earlier prototype and, in fact, the machine is now most attractive in both outline and finish.

The power of its Gipsy Major X engine gives the Ace a very good take-off and climb performance for a light, four-se t design.

hydraulic brakes would come as a surprise. However, there is no reason why he should not come to a safe standstill on the ground.

Before I tried to fly the Ace myself, I had the advantage of some dual instruction from Mr. R. F. Stedman, Chrislea's test pilot, who carefully demonstrated the take-off technique, the climb, steep turns and how to come out of them smoothly, and finally the approach and landing. Then, after a few minutes in the air using the dual wheel, we changed seats so that I could use the brakes and the accelerator pedal and fly from the left-hand side.

(Below) Mr. Stedman brings the Ace into formation for this air portrait.

An attractive impression of the Ace over the coast near Exmouth.

The view from the Ace (which is, of course, a nose-wheel design) is exceptionally good and it is possible to taxy with great precision using the hand throttle and the hydraulic brakes. It is necessary to steady the control wheel with the left hand to prevent it bouncing up and down against its stops, but no help in taxying is obtained as the elevators are not required and the twin rudders and fins are outside the effect of the airscrew slipstream.

Take-off Technique

For take-off the Ace must be carefully lined-up on the runway and made to roll straight with the aid of the brakes. Before moving off, full left rudder trim (right-hand trim lever forward) and neutral elevator trim are set. About half flap is lowered, a smart chromium-plated pointer neatly situated in the starboard wing root indicating the number of degrees. The direct cold-air intake for the Gipsy Major X is opened, and the parking brake catch is pushed in. The brakes are then released by a slight depression of the pedals and the Ace starts to move forward.

As soon as any initial tendency to swing is checked with brake, the throttle is opened smoothly and quickly and the control wheel held fully to the left until the speed has built-up sufficiently to give directional control on the rudders. When the throttle is fully opened the feet are kept off the brakes. As soon as flying speed is reached the wheel can be brought back into the centre and depressed slightly in preparation for leaving the ground. At approximately 55 m.p.h. additional slight pressure downwards on the stick causes the Ace to leap off the ground at quite an alarming angle of climb, which, however, is found to be quite safe and can be maintained with an ascent rate of at least a thousand feet per minute.

For the inexperienced pilot, who has probably unstuck with slight rudder or aileron applied, the first 50 feet of climb is occupied with the checking of skid and yaw, but as Mr. Stedman showed, this is not the case with a pilot experienced on the Ace. The controls themselves are extremely light, and, as one quickly finds out, the less one does with the ailerons the better the Ace flies under all normal circumstances. Light spring-loading of ailerons and rudder to give more positive centring might be an advantage.

For the first few minutes of climb and level flying, both straight and on the turn, the needle and ball were chasing around in a most energetic manner, and for a pilot used only to conventional controls keen mental effort has to replace most instinctive actions for co-ordination of control movements. Two things occurred to me at this stage of the flight; first that there was a similarity between learning to fly the Ace straight and level and flying the Sikorsky 51 helicopter. In each case, the pilot feels that he has one extra control to cope with, and although he knows how to apply rudder, elevator or aileron, he has to think about each movement individually, and the response is usually nearly but not quite what he expected. The other thought that crossed my mind was that for the very experienced instructor who wishes to remind himself of a pupil's difficulties of co-ordinating the movement of controls at the *ab initio* stage, the first few minutes of straight and level flying in the Ace, particularly if the air is a little bumpy, will take him right back to his second or third hour as a pupil. By the end of an hour's flying on the Ace, a pilot should begin to feel reasonably at home, and there seems little doubt that with five or ten hours' experience, flying with a three-movement wheel could seem quite normal and natural.

To describe manœuvres on the Ace in more detail it is necessary to stress that the controls are very sensitive indeed, and so long as it is correctly trimmed the aircraft, to use automobile terminology, will "self-centre itself" quite well. If one appears to be getting a little involved with yaw and skid a good way of getting things straight is to let go of the wheel momentarily, whereupon it will gently centre itself and the pilot would probably notice that he had been applying some aileron pressure and at the same time unintentionally trying to keep straight with rudder. To make a turn on the Ace is very simple indeed; all that is required is very slight side pressure on the wheel in the

The three wheel-control movements of the Ace.

Ace in the Air . . . . .

direction one wants to go. As the turn develops, the usual small stick-back movement is replaced by a slight downward pressure on the wheel. There is no need to use aileron except in the form of a correction to increase or decrease bank if there is a tendency to slip or skid. When changing from left to right turns, or coming out of a turn rapidly, it is also necessary to use some aileron with the rudder.

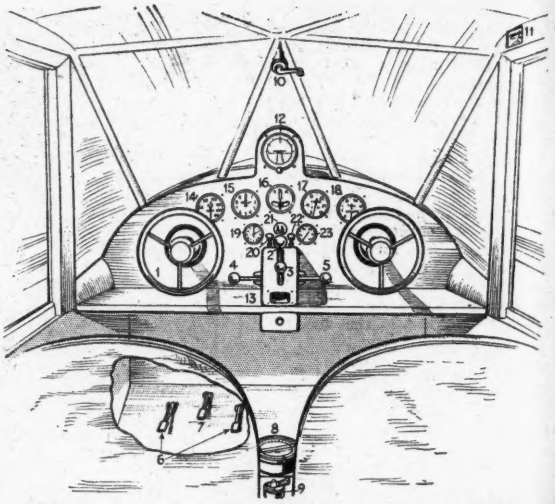
A change of attitude or power must be accompanied by adjustment of trimmers, otherwise distinct pressure is required on the control wheel, and this in turn tends to lead to clumsy flying. The trimmers themselves are conveniently placed and sensitive.

With only two people up it is not possible to stall the Ace, even with wheel fully down (stick full back). With the control in this position the aircraft assumes a medium nose-up position, rather similar to the climb attitude, and loses height fairly fast at several miles an hour above the stalling speed. If a stall is induced by pulling the nose up sharply from the glide, the stall is experienced in the form of a gentle sink back to the gliding attitude. I was informed that with four passengers and a full additional load of luggage, the Ace will stall with control wheel fully down, and that under these circumstances the initial straight sink is followed by a wing dropping and finally the development of a gentle spiral dive. Apparently, the Ace will not spin.

Landing Technique

The technique used for the approach and landing is rather different from that on other light aircraft, and the permissible speed range is quite wide, although around 65 m.p.h. seems quite natural. Flap is wound down all at once or by degrees as desired, and, depending upon height and nearness of the airfield, the hand throttle is closed right back to allow the Ace either to sink in, or, using the accelerator pedal, to be motored in. If there is too much height in hand, the Ace will side-slip quite steeply without speed building up. For steadiness during hold-off and landing, the wheel is held in both hands, and the foot accelerator is used to give a trickle or burst of power as required. The Ace is floated on to the ground in a slightly tail-down attitude, and once firmly on its main wheels is eased on to its nose wheel and from then on direction is controlled by the brake pedals. The touch-down speed with two up is about 45 m.p.h.

Reference was made earlier to a cold-air lever which is not usually found on Gipsy Major engines. The explanation of this is that the intake is normally connected to the throttle for automatic operation, but in the case of the Ace this does not suit the spring-loading of the double system of hand throttle and accelerator. For full power, take-off and climb, a separate lever is, therefore, provided for the intake. Incidentally, when flying light at full throttle, the nose of the Ace can be pulled up to an alarming angle in the climb, and although the climbing speed drops off slightly, and the rate of climb, after building up to a peak of about 1,300 ft/min, drops off again, there is no tendency whatever to stall even when the machine appears to be standing on its tail. Another use of the accelerator is for formation flying, when it is both convenient and effective.



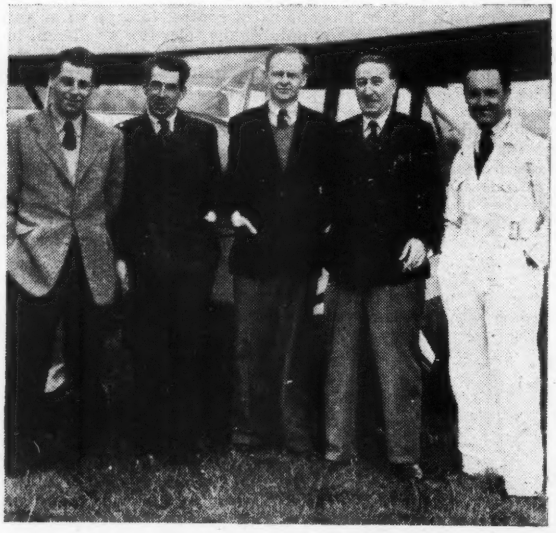
1. Tri-movement control; 2. Hand throttle; 3. Mixture control; 4. Elevator trim; 5. Rudder trim; 6. Brake pedals; 7. Accelerator; 8. Compass; 9. Fuel cock; 10. Flap control; 11. Flap angle indicator; 12. Artificial horizon; 13. Directional gyro; 14. Airspeed indicator; 15. Altimeter; 16. Turn and bank indicator; 17. Rev. counter; 18. Fuel contents; 19. Clock; 20. Parking brake; 21. Magnetic switches; 22. Carb. hot air; 23. Oil pressure.

Before flying the Ace, I examined a batch of about eighteen machines now under construction at the factory at Exeter Airport, and was most impressed by the extreme simplicity of design and by the excellent overall and detail finish inside and out. The construction is all of metal, except for a few minor components in wood, and the machine is chiefly fabric covered. The upper portion of the fuselage behind the cabin is light-gauge dural sheeting, and the wing leading edge and the whole tailplane are also metal skinned.

The cabin comfortably holds four people of average size, and the separate baggage compartment behind the rear seats is quite spacious. However, the designers are the first to admit that a few more inches of leg room for the rear seats would be an advantage. The floor is level and 20in high when the aircraft is on the ground.

The instruments, which include an artificial horizon and directional gyro, standard fitments at the price quoted for the whole aircraft, are very neatly grouped, and the whole arrangement of the cockpit, and the quality of its trimming, sets a very high standard. Space considerations led to the present positioning of the directional gyro, a large instrument, which is the only one inconveniently (though neatly) placed.

After the unusual control system it is probable that the next points which would particularly remain in one's memory in connection with the Ace, would be the neat, businesslike cockpit, the excellent view in all directions, and the simple but highly effective Goodyear plate-type hydraulic brakes.



A Chrislea group photographed recently at Exeter are (left to right) R. C. Christoforides, chief designer; C. A. L. Morton, chief inspector; D. Lowry, sales and publicity; R. F. Stedman, test pilot; and P. R. N. Roxborough, ground engineer.

SUPER ACE SERIES II DATA

Span	36ft.
Length	21ft. 6in.
Max height over wing-tips	7ft. 2in.
Wheel track	6ft 9in
Wing area (gross)	177 sq ft
Wing loading (2,350 lb a.u.w.)	13.3 lb/sq ft
Power loading (145 b.h.p.)	16.2 lb/h.p.
Max power at 2,550 r.p.m.	145 b.h.p.
Take-off power at 2,300 r.p.m.	139 b.h.p.
Weight empty, including full equipment	1,344 lb
Weight loaded	2,350 lb
Performance at Full Load	
Max level speed	126 m.p.h.
Cruising speed (2,300 r.p.m.)	115 m.p.h.
Stalling speed (flaps down)	38 m.p.h.
Rate of climb	800 ft/min
Rate of climb (light)	1,350 ft/min
Still air range (5 per cent. allowance for take off)	420 miles

Meet the booking Clerk!

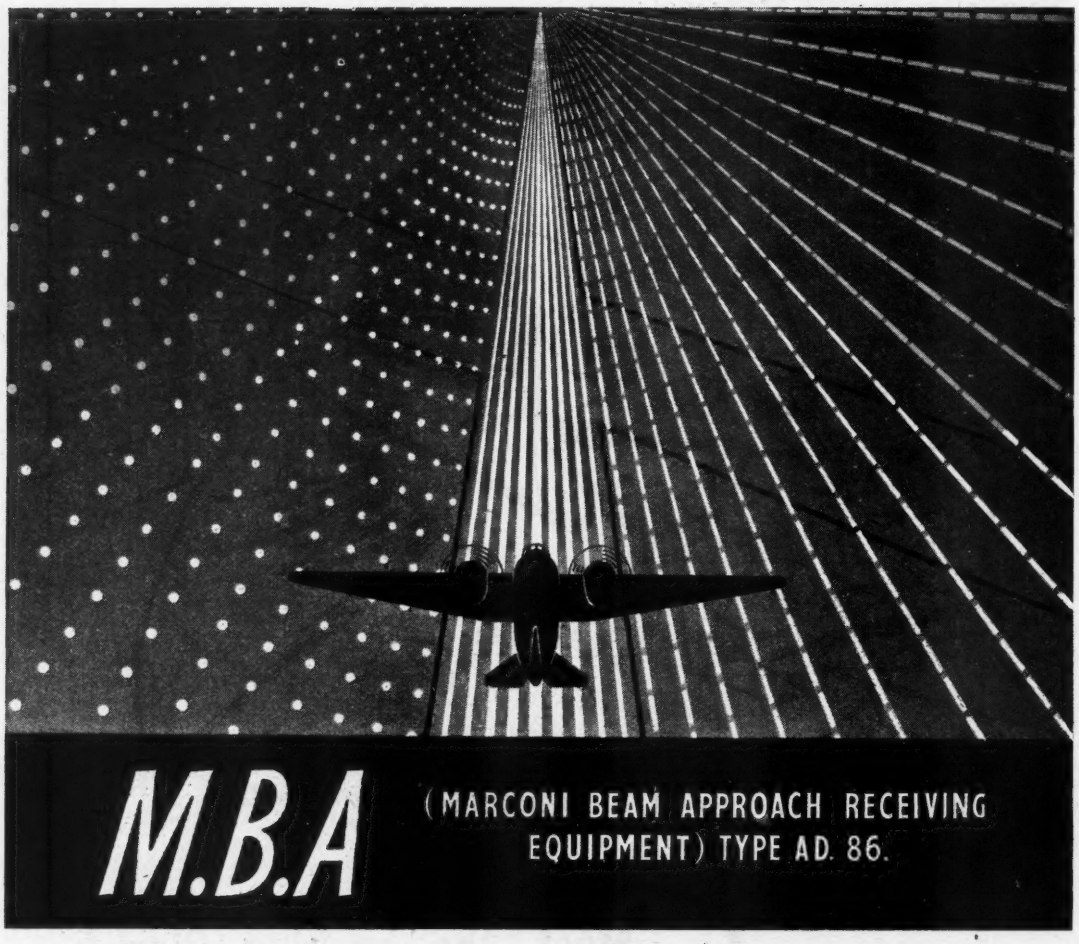
In a B.E.A. office or in a travel agency—his first aim and the first aim of B.E.A. is to get you from one part of Britain or Europe to another with regularity and without fuss

Northolt—Amsterdam. Daily services. Flying time: 1½ hours
Northolt—Oslo. Three times weekly. Flying time: 4 hours

BEA

BRITISH EUROPEAN AIRWAYS

Reservations :—principal travel agents (no booking fee) and Airways Terminal S.W.1. Victoria 2323



M.B.A

(MARCONI BEAM APPROACH RECEIVING EQUIPMENT) TYPE AD. 86.

The Marconi Company announces a further addition to its new range of miniaturised airborne radio equipment. Designed for use with the standard beam approach installation at airports, M.B.A. combines course and marker beacon receivers in a unit unique in its small size, light weight and high performance.

FREQUENCY COVERAGE:	
Course receiver:—	30.5 Mc/s - 40 Mc/s by continuous remotely controlled tuning.
Marker receiver:—	38 Mc/s.
SENSITIVITY:	
Course receiver:—	30μV input for standard output of 225 mW into 33 ohms. Signal/noise ratio better than 20 db.
Marker receiver:—	2.5 mV for above output.
SELECTIVITY:	
Course receiver:—	230 kc/s total bandwidth at 20 db attenuation.
Marker receiver:—	3.4 Mc/s total bandwidth at 20 db attenuation. (Television sound signals (41.5 Mc/s) are attenuated at least 30 db — therefore no interference is experienced from this source.)
SIZE:	8" high x 4" wide x 12½" deep (RCEEA standard size).
COMBINED WEIGHT OF RECEIVER UNIT AND REMOTE CONTROLLER:	10 lbs. (4.54 Kgs).
WEIGHT INSTALLED:	18 lbs. (8.18 Kgs).

Marconi

THE GREATEST NAME IN WIRELESS

MARCONI'S WIRELESS TELEGRAPH COMPANY LTD., MARCONI HOUSE, CHELMSFORD, ESSEX

The New Marine Air Terminal

SOUTHAMPTON was the scene, on April 14th, of a very pleasant ceremony. In the presence of the Mayor and Mayoress of Southampton, the Minister of Civil Aviation officially opened the new B.O.A.C. marine air terminal in Berth 50, Southampton Docks. Actually the terminal has been in use for some little time, but the official opening ceremony had been deferred until Wednesday of last week. Even now, the terminal is but partly finished, only one of the two floating pontoons being in place. This, however, is sufficient for the sixteen services a week (eight inward and eight outward) operated at present with flying boats of the Hythe and Plymouth classes. When the service to South Africa with Solents is opened (Sir Harold Hartley, chairman of B.O.A.C., mentioned May 4th as the opening day) the number of services will gradually increase to 22 a week.

Sir Harold Hartley welcomed the guests, and expressed the pleasure of B.O.A.C. in being back at Southampton after an enforced absence at Poole during the war years. He particularly welcomed to the ceremony Mr. W. Hudson Fysh, of Qantas Empire Airways, and Mr. James N. Greenland, of Tasman Empire Airways, who were working closely with B.O.A.C. on the Australasian routes.

Lord Nathan referred to the difficulty of finding suitable bases for marine aircraft, surprising in view of the length of coastline and rivers, and said that in India there were, he was told, only three localities suitable for the establishment of such bases. They had to have clear approaches, plenty of manœuvring space, and should be close to populous centres.

Mr. J. W. S. Brancker, manager of B.O.A.C.'s Eastern Division, then introduced to Lord Nathan Capt. H. W. C. Alger, manager of No. 4 Line and in charge of the maintenance and overhaul base at Hythe, and Mr. H. J. Bingham, station superintendent at the Southampton base. These two in turn presented to Lord Nathan members of their respective staffs.

The Mayoress then christened the flying boat *Southampton*, and the Mayor, Councillor F. Dibben, welcomed B.O.A.C. back to Southampton and promised every assistance which the corporation could give. The Mayor then presented a ship's clock to the *Southampton* via Messrs. Brancker and Alger. After an inspection of the aircraft by the Mayor and party, a very excellent lunch was served in the new building, one, we were told, of the pre-cooked and frozen lunches normally served on the flying boats en route.

Speeches at lunch were confined to two: a short one by Sir Harold Hartley, who said, with a sly look at Mr. Hudson Fysh, that it would be interesting to see whether future passengers would prefer the fast landplanes or the more sedate flying boats with greater comfort. Mr. John Elliott, now head of the Southern Division of British Railways, pulled Sir Harold's leg in a very witty speech, recalling the old days of Railway Air Services, and, more seriously, promised every co-operation from the railway in giving speedy transport to the marine air terminal.

A short demonstration of the berthing of a flying boat was given, but as it only included running the boat into and out of the floating pontoon, and not the picking up of the mooring buoy, it told only part of the story. The system in use is not quite that evolved by Mr. Gouge, of Saunders-Roe. The boat taxies up to a buoy and the radio officer secures the bow mooring to it. A launch is necessary for the operation of attaching the stern release hook to the two cables which winch the boat into the fork of the pontoon, tail first.

The terminal buildings ashore are well laid out, with rooms for customs, immigration, passport and health facilities. The capacity is sufficient for dealing with two flying-boat departures or arrivals, or with a departure and an arrival, simultaneously. Two sets of between 22 and 34 passengers (according to the flying boat concerned) can be dealt with at half-hourly intervals, and it is expected that up to 1,000 passengers per week could be handled smoothly. Moreover, there is pleasant accommodation for relatives and friends of air travellers while awaiting arrivals or departures. Covered ways lead from the railway platform to the pontoons, so that passengers will not only avoid the bother of going out to the flying boats in launches, but will be under cover the whole time, a not unimportant consideration in bad weather.

On arrival, the passengers go into a reception lounge before passing customs and other departments. When they reach the customs hall their luggage is already awaiting them, and when all formalities are completed, they await the departure of the flying boat in another lounge. All facilities, by the way, are duplicated so that outgoing and incoming passengers do not get in one another's way.

A restaurant and lounge bar on the first floor of the building gives a pleasant view of Southampton Water, and run the whole length of the 110 feet of the façade. The restaurant will seat 68 passengers and the lounge bar 65.

The rest of the first floor houses offices of the M.C.A., airport commandant, the B.O.A.C. station superintendent, B.O.A.C. signals, teleprinters, telephone exchange and telecommunications supervisor, with the M.C.A. flying-control organization in a tower at the end of the building.

International Charter Meeting

SINCE 1946 the Fèdèration Internationale des Transports Aèriens Privès has been established with headquarters at No. 6, Rue Galilèe, Paris; but owing to post-war difficulties in many countries, the organization has not been particularly active, and members met in London on April 15th and 16th to discuss ways and means of bringing the organization up to date. It was the third meeting of the Fèdèration, and until recently only two national associations—the British Air Charter Association and the French Groupement Professionel de l'Aviation Commerciale Privèe—had attended with representatives of companies from Holland and Belgium. However, two new associations, the Commercial Aviation Association of South Africa and the Association Suisse des Transporteurs Ariens Privès (Astair), have joined, and with observers from Norway, Belgium and Italy, the general organization of the international body was discussed. This recent meeting was mainly exploratory, and after agreeing on general principles the possibilities of unifying documents of carriage was examined. The delegates also discussed the position of charter operators and the attitude of their respective governments. The next meeting of the association to discuss further the findings of this meeting will be held in Paris shortly.

The main object of the association is to obtain representation at I.C.A.O. meetings, and it is hoped to send representatives to Geneva in May. The Fèdèration hopes to represent for the private operator what I.A.T.A. represents for the air lines, and Mr. H. R. Gillman, who is actively engaged in the preliminary organization, would welcome correspondence with associations or operators in other countries who are interested in the international organization. Amongst others he is already in touch with operators in Australia and America, but in the case of the latter there are several associations. The U.K. delegation consisted of the executive committee, G/C. W. N. Cumming, Capt. G. P. Olley, G/C. D. F. McIntyre, Mr. W. E. W. Grieve, Mr. O. Rylands, Mr. S. Kenneth Davies, Capt. T. W. Morton and Mr. H. R. Gillman, secretary of the British Air Charter Association.

"*Flight*" photograph.

Talking together at a reception held at Londonderry House for the international charter representatives. (Left to right) Mr. Einar Froysaa (Norway); the Duke of Hamilton and Brandon (Scottish Aviation, Ltd.); Captain G. P. Olley (Olley Air Services); Air Commodore H. G. Brackley (B.S.A.A.); and Group Captain W. N. Cumming, chairman of the B.A.C.A. The British Corporations are associate members of the B.A.C.A.

VISUAL AIDS FOR LOW VISIBILITY CONDITIONS

A Discussion of the Fundamental Requirements

IN a Paper delivered before the Royal Aeronautical Society on April 15th, Mr. E. S. Calvert, B.Sc., A.R.C.Sc.I., who is head of the Illuminations Sections, Electrical Engineering Department, Royal Aircraft Establishment, described some of the work which has been done at Farnborough with the object of establishing some general principles for the guidance of the Ministry of Civil Aviation Airfield Lighting Committee, this being the body charged with the task of deciding what visual aids shall be installed at the civil airports of this country. The lecturer pointed out that the work is far from completion and from the scientific point of view his account must necessarily leave some loose ends. However, he felt that the method of attack and the underlying ideas might prove useful to other workers in this particular field.

Visual aids consist of day markings and lights laid out on the ground in patterns which are intended to assist the pilot in making those judgments of height, distance and direction which are necessary in order that he may approach the runway, land on it and taxi to the unloading point. Any discussion of visual aids, therefore, involves the question of how the pilot makes these judgments Everyone is so accustomed to making visual judgments from childhood onwards that it has become instinctive and subconscious and it is rare to find anyone who possesses sufficient insight into his own mental processes to enable him to describe convincingly and intelligibly how he makes them. The lecturer was convinced that a systematic study of this problem would pay handsome dividends in increased safety.

Degrees of Visibility

In good and moderate visibility, the best daylight approach aids are white or yellow markings on the runway. As the visibility gets worse, a point is reached at which the runway ceases to be visible at a distance sufficient to enable a visual approach to be made. For a given meteorological visibility* it is not possible to say at exactly what distance the runway will be seen as this depends on such factors as the reflectivities of the runway and its surroundings, the direction in which the sun is shining, the time of day and so on; but, as a rough guide, it may be taken that, in this country, the runway is visible for about a mile when the meteorological visibility is three miles. In this visibility, a range of one mile in daylight can be obtained from lights having an intensity of 5,000 candles. In visibilities worse than three miles, lights of this intensity will be seen at greater distances than the runway: lights of more than 5,000 candles could therefore constitute a useful daylight aid.

The Royal Air Force discovered this in 1942 by noticing that they could easily find airfields where synthetic day/night training was in progress when conditions were such that they had difficulty in finding their own airfields, the reason being that a sodium flare path was used as part of the day/night equipment. As a result of this discovery, the use of sodium flare paths spread rapidly throughout Bomber Command. This was the origin of the well-known Sodium Flare Path Type F which, since the flares gave an intensity of about 8,000 candles, may be regarded as the first high-intensity landing aid to be used in daylight in this country.

Because of their yellow colour and their large size, i.e., about 2ft by 1ft, these sodium flares are very distinctive, particularly when seen against a background of bluish haze or morning mist. Their light output per watt is very high, about 70 lumens per watt as against 6 lumens per watt for yellow light obtained by filtering an incandescent source. This high efficiency means that wide angles of the order of 120 deg horizontally by 30 deg vertically can be covered without using more than 150 watts per fitting and this, in turn, means that the flares are suitable for use as short-range aids to navigation, that is, for marking fixed points. They are now commonly used by the R.A.F. as daylight markers and they are very effective, particularly in the dull, misty weather which is so common in these islands.

Candle-power and Range

A light of 8,000 candles has a daylight range of one mile in a meteorological visibility of two miles, and this may therefore be regarded as about the limiting condition in which visual approaches can be made on the sodium flare path. If the intensity is pushed up to 100,000 candles, then the limiting condition can be lowered to a meteorological visibility of about 0.85 miles. Beyond this point, enormous increases in intensity are required to effect much improvement, and it becomes clear that an answer to the problem of daylight landing in really bad weather can never be found by increasing the intensity of the runway lights even if dazzle could be prevented.

The obvious all-weather solution is therefore to lay down a pattern of high-intensity lights in the approach zone and to feed the aircraft into this pattern by means of a radio approach aid. The radio aid is then relied upon to bring the aircraft down to a height of about 200ft in the worst conditions in which the visual aids are usable, and the problem is to make the visual aids link up smoothly with the radio aid at about this point.

Instruments and Lights

In really bad visibility, the technique of making the final approach on a continuous string of lights is quite different, first, because the runway lights are invisible for most of the approach and, second, because the horizon is ill-defined or non-existent. It was widely supposed that if a pilot were able to see three or four lights ahead of him, he would somehow be able to complete his approach. On this supposition, pilots who were skilful enough to make an accurate initial approach by radio down to 200ft should have been able to land on the lights in meteorological visibilities of the order of 200 yards by day and 100 yards by night, provided that the aircraft had a reasonably good downward view. A few very experienced pilots have done this under test conditions but the reports available to the lecturer indicated that these landings were attended by far more risk than could be accepted under operational conditions.

Even in better visibilities, many pilots found difficulty in changing over from instruments to lights and complained that the lights seemed to play tricks. For instance, on first picking up the lights, the pilot, in correcting a lateral error, might find that the lights seemed to slip sideways away from him or even appeared to swing from side to side. Also, since the light sources were small enough to appear as points, there was nothing except differences in intensity to indicate which lights were far off and which were near, and even this indication was faulty because of the narrow divergence of the beams.

Since the lights had no appreciable size, no use was made of one of the chief mental mechanisms which everyone uses in order to find his way about the world, namely, observation of the texture of the foreground, or to put it another way, the observation at short range of objects the real size and shape of which are known. The result was that the psychological obstacles to quick interpretation were increased, an effect which is particularly dangerous to a pilot suffering from fatigue, worry or other distractions.

Finally, since this pattern gives no indication of whether or not the aircraft is over-shooting or under-shooting until the runway lights come into view, the meteorological visibility at which this pattern ceases to be safe for operational use is about 900 yards in daylight or about 300 yards at night. This applies more or less to all systems consisting merely of single or double lines parallel to the extended centre-line of the runway.

Inconspicuous Runways

On a modern airport, the contrast between the runway and the rest of the surface is often small and the surface itself may have little texture. Day-time mist first reduces what contrast in texture there is and, as it gets worse, finally blots out the whole horizon and all the vanishing points associated with it, so that the pilot is left only with the lights for making his visual judgment. It follows that the approach light pattern must, as a first necessity, supply the equivalent of a horizon and it also follows that this can be done by bars of lights running transversely across the extended centre-line of the runway. It is also clear that patterns, the directional indications of which are derived from vanishing points, e.g., parallel lines,

** Strictly speaking, the meteorological visibility is the distance at which a very large dark object can best be seen in daylight. In drawing range diagrams, this is conventionally taken as the distance over which the atmospheric transmission is 2 per cent.*

vees and funnels, are to be deprecated, because as visibility gets worse, less and less of the pattern is seen, and mental calculations as to where the vanishing point would be if it could be seen get progressively more difficult.

For this and other reasons, the lecturer had come to the conclusion that the directional indication is best provided by a single line of lights along the extended centre-line of the runway. The type of pattern recommended, therefore, consists of a centre-line of lights with bars of lights arranged at intervals across it.

Pilots would probably all agree that they could fly level over a pattern consisting of a line with cross bars of equal length, since all they would have to do would be to fly so that successive bars subtended the same angle as they disappeared underneath the nose, and this would be little different from flying level over a runway. Because this type of pattern gives indications of alignment, bank and glide path in a manner which is free from ambiguity even when only a small portion of the whole pattern is seen, the lecturer suggested that some pattern on this principle will ultimately provide a solution which will be generally accepted.

Light Wavelength and Blur

One question which is often raised is whether fog will blur the sharp outline of the bars in the same way as the bulb of an opal lamp blurs the outline of the light source. The answer is that some opal glasses do not blur the outline of the source, depending on the ratio of the diameter of the diffusing particles to the wavelength of the light. Anyone can satisfy himself by observing the sun in cloud or street lamps in fog that the sharp outline of the light source is not in fact blurred. This has also been demonstrated directly by observations of the bar pattern from a captive balloon, and there are now quite a number of observers who can confirm that the bars appear with clear-cut outlines both by day and by night in all atmospheric conditions in which they have been observed.

Another question often raised is that of dazzle. The answer to this is that, with the intensities under consideration, i.e., 5,000 candles for the runway lights and 50,000 to 100,000 candles for the centre-line approach lights, no trouble is experienced in daylight. At night, the runway and the centre-line lights will be dimmed to suit the atmospheric conditions. At the worst, the lights will not be dimmed, but in these instances, it should be remembered that the pilot will be landing by the light patterns and not by observing the texture of the foreground.

If the pilot has been able to use the approach aids successfully, the aircraft should arrive over the threshold of the runway at a height such that the pilot's head is about 50ft above the ground. After the end of the runway has been crossed, the pilot has no further need to relate his height to any particular point of touchdown and a pattern which indicates direction, height and lateral displacement is sufficient. A pair of parallel lines indicates direction by means of their vanishing point and also indicates height and lateral displacement by means of changes in the perspective angle. The pilot is, therefore, able to judge his height from a bar of parallel lines only provided that he is familiar with the scale of the pattern. The importance of keeping the distance between the rows of runway lights constant has always been realized in this country, and this distance was maintained at 150ft on those airfields recently built in which the width of the runways has been increased to 300ft. This decision was far-reaching because it carried with it the implication that flush-type runway lights would have to be used and, as is well known, very high intensities cannot be obtained from this type of light.

International Differences

The lecturer pointed out that there was some variance of opinion regarding British and American practices and suggested that, if the distance between rows cannot be standardized internationally, then it may be necessary to select some scale fixing pattern internationally agreed as regards dimensions, and add this to the normal runway pattern for a certain distance on each side of the normal touch-down point. These scale effects, provided that they are not too large, are important only in fog and it is likely therefore that scale fixing patterns will only be required on instrument runways.

After devoting some attention to the lighting patterns for taxy-ways, Mr. Calvert referred to the R.A.E. Simulator, built by J. W. Sparke and H. F. Ringe, two of his colleagues, with controls arranged as in a real aircraft so that an observer looking into the instrument and operating the controls, would see the light patterns behave exactly as they would do in reality. The Simulator was designed and built in less than three months and has proved to be a most useful research tool. It was completed in October, 1947, and since then demonstrations have been given to about 400 people, which has meant about 8,000 simulated landings.

Function of Day Markings

The lecturer then observed that, up to the present, day markings have not been seriously considered in this country, but there is no doubt that they could be made to serve four very useful functions, (a) to increase the distance at which the runway can be picked up, (b) to assist the pilot in making his judgments of height by accentuating the perspective angle and by giving texture to the surface, (c) to provide accurate guidance in the horizontal plane when the aircraft is close to the ground, or taxying, and (d) to remove ambiguities from the ground indications.

The lecture was concluded with the suggestion that, from the considerations put forward, there is good ground for belief that a landing system which integrates existing radio approach aids with properly designed high-intensity visual aids, a scientific arrangement of day markings and perhaps FIDO, and also utilizes a training device such as the R.A.E. Cyclorama, would provide almost a complete solution to the problem of landing aircraft in bad visibility. If operational experience should prove this to be the case, then those improvements in regularity and punctuality which are necessary to the success of air line operation would be in sight, traffic control would be simplified and the way would be open to the more economical utilization of airports and aircraft.

NEW ANSON VARIANTS

IDENTICAL in construction, and powered with Armstrong Siddeley Cheetah XV engines (425 h.p. for take-off), the Avro Anson T.20, T.21 and T.22 are equipped respectively for training in Rhodesia, for specialized navigational instruction and for radio training. Typical data are: Gross weight 10,400lb; max. level speed 171 m.p.h.; max. cruising speed 167 m.p.h.; economical cruising 150 m.p.h.; sea-level rate of climb 790 ft/min; service ceiling 14,000ft; max. range 645 miles; fuel capacity 140 gal.

CHIPMUNKS FOR THE V.R.

REPLYING to a question by A. Cdre. A. V. Harvey, Mr. Arthur Henderson, the Air Minister, has disclosed that D.H. Chipmunk trainers will be replacing Tiger Moths in the R.A.F.V.R. Ansons will continue to be used for the training of V.R. signallers and navigators.

This most welcome news concerning the Chipmunk is not altogether unexpected and will be received with the greatest satisfaction by instructors and pupils alike.

It is reasonable to suppose that the British Service version may later be used by the R.A.F. and that it will have a blind-flying panel in both cockpits, a battery for electrical "intercomm." and night-flying equipment.

SUPPLY OFFICERS' CONFERENCE

THE first of what is hoped will be a series of R.A.F. supply conferences, to which the Senior Equipment Staff Officers of all R.A.F. home and overseas commands, as well as representatives of all the Dominion air forces were invited, has lately been held at the Air Ministry. The conference was opened by the Vice-Chief of the Air Staff (Air Marshal Sir James Robb) in the absence of the Air Member for Supply and Organization (Air Marshal Sir Leslie Hollinghurst), who was away on an overseas tour, and during the two-and-a-half days that it was in session under the chairmanship of the Director-General of Equipment (Air Vice-Marshal T. E. Drowley), various problems of common interest were discussed. It is hoped that as a result of the conference greater standardization, both of supply and of methods, will be achieved.

Later the delegates were to visit various supply organizations in Maintenance Command to see how the supply requirements of the R.A.F. are met.

GROUND-ATTACK VAMPIRES

IT has been known for some time past that a version of the de Havilland Vampire is to become a standard fighter-bomber in the R.A.F., in succession to the Hawker Tempest. The variant concerned is the F.B. Mk. V and is generally similar to the Vampire III. With Swiss markings, an essentially similar machine is known as the F.B. VI. The F.B. 50 is the type to be supplied under the second Swedish contract, lately announced.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THIS AIR TRANSPORT BUSINESS

Diesel Engines the Answer

REFERRING to the Editorial "This Air Transport Business," (*Flight*, April 8th) I should like to point out that air transport is in reality far and away the cheapest, safest and fastest of all means of transport over long distances.

In the first place it must be understood that, in my opinion as an engineer with both railway and flying experience, aircraft for economical and safe operation have yet to be designed in this country or in America. The fact that no aircraft is fitted with diesel engines entirely removes these so-called civil aviation aircraft from the categories of both safety and economy of performance.

Both the French and the German civil air services were, before the war, going over to the diesel engine for this purpose because it uses a fuel which entirely dispenses with all fire risk and also gives a better performance than the high-octane petrol engine. The fuel is a third of the price, and with supercharging and double the compression pressure uses 20 per cent less fuel than the petrol engine. The diesel was developed during the war by the Germans to be actually lighter than the petrol engine. The Junkers Jumo 223 weighs only 1.0 lb per h.p. This is revealed in the book "Aircraft Diesels" by Wilkinson. Pitman publication.

For road transport, such as buses and lorries, the saving in fuel is over 50 per cent for the same h.p. according to the book "The Modern Diesel" (Iliffe and Sons), now being reprinted.

Again, the airliner to-day is really too much of a war machine and lands at far too high a speed due to the wing area being clipped. A properly designed machine should, in my opinion, land and take-off at not more than 80 m.p.h. Such a machine, equipped with diesel engines, would be extremely pleasant, absolutely safe from fire risk and would cruise at 250 m.p.h. and could land anywhere without crashing, even in a forced landing. Also no expensive runways would be necessary.

Railways, it must be remembered, have to build a very expensive track which is capitalized at £30,000 (thirty thousand pounds) per mile in England and £17,000 per mile in America. Shipping, on the other hand, is very slow, involving feeding of passengers and sleeping accommodation, etc. Airways, therefore, should be an extremely paying proposition, given the proper equipment, which in my opinion does not exist, as yet.

J. R. GOULD.

Westcliff-on-Sea, Essex.

STUDYING THE PASSENGER

Just What B.O.A.C. Does

I HAVE read with considerable surprise the letter of Mr. G. D. Hart, in your issue of February 26th, regarding B.O.A.C.

If I may be permitted to be so terse, I have never read such arrant nonsense in my life. It is perfectly true that in the old days Imperial Airways was a little cavalier in its treatment of passengers, but the one good thing that seems to have come out of the nationalizing of British airlines is the improvement in courtesy and service that is so apparent in B.O.A.C.

I will admit that I have not travelled on B.O.A.C.'s European trips, but has anyone else? I rather thought that the services within Europe were conducted by B.E.A.

Within the last 12 months I have been fortunate enough to travel on the Atlantic service more than once, some journeys being made in the Constellation luxury, others in the old and not so comfortable Liberators. In every case the courtesy and helpfulness extended by the B.O.A.C. staff, air and ground, was something to appreciate. When we were stuck at Gander for 26 hours, through bad weather conditions in England, nothing could have exceeded the hospitality of B.O.A.C. Even though it was mid-winter, and Gander is hardly an inspiring spot, we were quite sorry to leave the place.

On the other side of the picture, I travelled not long ago on a special press flight with American Airlines. They also were courteous in the extreme but regretted that they had forgotten to put any water on board the DC-4 that was opening up a new International service. Neither was any other form of refreshment available. This was a pure accident, I know, but please let us have less of this lauding of American services when in fact they are no more infallible than any others.

The demand for speed is understandable, but at the expense of safety? No. And no airline operator would last long if he told his passengers that if they were not killed on the way they would at least reach their destination fast.

Perhaps Mr. Hart is just tired of life, but he should realize that most passengers set out on an air journey with the stupid idea that they want to arrive at the other end in one piece. The saving of an hour in ten, or even in five, does not make a very big appeal if it involves additional danger.

B.O.A.C. does a grand job, in spite of being hampered by the attentions of parasitic civil servants. Let credit be given where it is due.

BASIL R. CLARKE.

Toronto, Canada.

CIVIL AVIATION

Flying in the Scale of Values

YOUR correspondent, Mr. J. B. Matheson (*Flight*, April 8th), has exposed a rather good example of clear thinking on false premises. Certainly, he states an opinion but it is surely somewhat late in the day to say that "to expend a large effort on flying is madness."

Our present way of life makes commercial flying a necessity if only as a complement to the high-speed communication facilities of radio and telephone. I will grant that flying is not a necessity to the pleasure traveller, but if it exists, it must exist for all who wish to employ it. I cannot conceive any argument for flying ceasing to exist which could be accorded any degree of practicable validity.

Mr. Matheson further gives it as his considered opinion that flying is unsound in principle, yet makes the philosophical error of basing a principle upon material foundations. What Mr. Matheson more likely means is that flying—as we know it—is fundamentally unsafe. With this I most heartily agree, but it merely means that we have to beat the problem and this will never be done by flying less. The more we do, the more we learn and, although the progress may be empirical and, inevitably, slow, it is still progress.

It should also be pointed out that the cocktail bar (I know of no aircraft with a cinema) has been featured in the accommodation of some aircraft purely as a passenger convenience. No one would seriously suggest that an aircraft was deliberately designed just that much larger so that a cocktail bar could be fitted.

In the last paragraph of his letter, Mr. Matheson exhibits a point of view which makes one rather fearful of "planning." It is easily possible that some of those who plan for us might share your correspondent's evaluations of relative importance. One can but hope that this fear is groundless. By all means improve surface transport: let us grow food to the top of our national bent; let us build houses for everyone. These things are vital. But not at the expense of improving flying, for that, too, is vitally important.

Time does not stand still, Mr. Matheson, willy-nilly we go on and do our painful best. Success is a goal which is never reached by admitting defeat.

B. H. STANHOPE.

Bromley.

FORTHCOMING EVENTS

Apr. 30th.—United Flying Clubs Ball, The Dorchester, Park Lane.
May 5th.—British Interplanetary Society: "Lunar Research." H. P. Wilkins, F.R.Ae.S.
May 8th.—R.Ae.S. (Glasgow): Visit to Prestwick Airport.
May 11th.—R.Ae.S. (Graduates and Students): "The Light Aeroplane and the Future of Private Flying." P. G. Masefield, M.A., F.R.Ae.S.
May 17th.—Cannes International Air Rally.
May 19th to 28th.—Engineering and Industrial Equipment (Home and Export) Exhibition.
May 19th—Aircraft Recognition Society: "Aircraft Photography." John Yoxall.
May 21st.—Institute of Navigation: "Meteorology in Aviation: Is it Obsolete?" Francis Chichester.
May 22nd and 23rd.—Shannon Aero Club Rally.
May 24th to 29th.—Aircraft Exhibition Cardiff.
May 27th.—Royal Aeronautical Society: Wilbur Wright Memorial Lecture. A. Gouge, B.Sc., F.R.Ae.S.
May 29th and 30th.—Netherlands Aero Club Invitation Rally, Ypenburg, Holland.
May 29th and 30th.—Butlin's Week-end Air Rally. Speeton, Filey, Yorks.
June 5th.—Cardiff Air Display.
June 12th.—Wolverhampton Aero Club "At Home."
June 12th and 13th.—Butlin's Week-end Air Rally at Ingoldmells, Skegness.
June 13th.—Henri Bardel Cup for model aircraft with mechanical motors.
June 19th to 21st.—Royal Aero Club Week-end for Foreign Guests, London.

IMPROVED CONTROL: The Blackburn Firebrand Mk. V A, as shown in this new view, differs from the previous Mk. V in having power-operated ailerons. Good lateral control is especially desirable in a torpedo aircraft, which may have to resort to spirited evasive action after delivering an attack.

Award

THE King has been graciously pleased to approve the following award:—

British Empire Medal

Navigator IIA Raymond McIntosh Gilroy, Royal Air Force, No. 202, Advanced Flying School.

On the night of November 10th, 1947, Navigator IIA Gilroy was the navigator of a Wellington aircraft engaged on a night cross-country exercise. Whilst circling the airfield on return from the exercise, both engines suddenly failed and the aircraft crashed and caught fire. Navigator Gilroy took correct emergency action immediately before the crash occurred and thereby escaped uninjured; the pilot and signaller, however, were both rendered unconscious. Navigator Gilroy, finding the signaller apparently jammed beneath the wireless table, dragged him free and threw him clear of the burning wreckage. He then endeavoured to extricate the pilot, who was, however, already dead, but, owing to the heat of the flames, in this he was unsuccessful. Navigator Gilroy, having escaped unhurt when the aircraft crashed, sustained severe injuries during his gallant efforts to rescue his comrades; he was extensively burned about the face, hands and knees. By his prompt and heroic action this airman undoubtedly saved the life of the signaller.

Ultra-Short Radio Waves

PHYSICISTS, who discovered during the war that weather conditions have marked effects on the propagation of ultra-short radio waves (as used in radar), wish to find out the reason for this and to discover what the relationship is between the meteorological and radio propagational properties of the atmosphere. Investigations will be started this month in Malta by physicists from the Ministry of Supply's Telecommunication Research Establishment at Malvern, assisted by the captains and aircrews of two R.A.F. Lancasters.

Ultra-short waves normally follow an optical path, and are eventually "lost," but under certain conditions "ducts" are formed in the atmosphere which have the effect of guiding radio emissions so that they follow the earth's curvature. These so-called "ducts" are layers in the atmosphere which are better suited to the conductivity of radio waves than the normal atmosphere, and the emissions travel along the "ducts" instead of going out to space. This phenomenon, which has important effects on R.A.F. communications, is not unknown in the British Isles but it is generally much more pronounced in warmer climates. In Malta, for instance, these conditions (called "super refraction") exist from about May to September. At the height of summer they are almost continuous.

The two Lancasters have arrived at Luqa and tests will continue until June over a considerable area round the island.

Royal Air Force and Naval Aviation News and Announcements

Appointment

THE Air Ministry announces the appointment, with effect from July 1 next, of Air Vice-Marshal John Whitworth Jones, C.B., C.B.E., as Air Officer Commanding-in-Chief, Technical Training Command, in place of Air Marshal Sir Ralph S. Sorley, K.C.B., O.B.E., D.S.C., D.F.C., who will retire from the active list on completing his tour in this post.

Air Vice-Marshal Jones has been A.O.C., Malaya, since November, 1947, and was formerly Director-General of Organization at the Air Ministry from June, 1945. He was previously Assistant Deputy Chief of Air Staff, South-East Asia Command, where he went in November, 1943, after having been A.O.C. No. 9 (Fighter) Group and No. 84 Group (2nd Tactical Air Force) in turn. From February, 1941, until towards the end of 1942 he was Director of Fighter Operations at the Air Ministry.

He was educated at St. Paul's School and at the City and Guilds Technical College, and after service as a sapper in the Royal Engineers he was commissioned in 1917 in the Royal Flying Corps, from which he transferred to the Royal Air Force.

Director of Air Force Welfare

A. CDRE. G. R. C. SPENCER, C.B.E., until recently Commandant of the Central Bomber Establishment at Marham, Norfolk, has succeeded A. Cdre. J. A. Boret, C.B.E., as Director of Air Force Welfare. He commanded the Central Bomber Establishment from its formation in October, 1945, as the R.A.F.'s centre for the study and operational development of bomber tactics and equipment, and last summer he was host to the officers and crews of United States Air Force B-29s who visited the establishment during their goodwill mission to this country. In his new post he is responsible for the welfare policy and organization for the Royal Air Force and Women's Auxiliary Air Force at home and overseas, including entertainments and other leisure time activities on

Service Aviation . . . . .

Stations; club and canteen amenities; and assistance in personal welfare cases especially those of a compassionate nature or involving hardship.

A. Cdre. Spencer was born in November, 1901, and, after being educated at the Royal Naval Colleges at Osborne and Dartmouth, became midshipman in the Royal Navy in 1917. He served in the Navy until he entered the Royal Air Force College, Cranwell, as a cadet early in 1920 and was given a permanent commission in the Royal Air Force in December of that year. In the recent war he was in turn a squadron commander, an Air Staff officer at the headquarters of No. 2 Bomber Group, and a bomber station commander before going to Africa in December, 1942, as an Air Staff Officer with H.Q. 1st Army. He afterwards served at the headquarters of the North West Africa Tactical Air Force, returning to the United Kingdom in July, 1943, to become Air Officer. Towards the close of the war he was given a similar appointment at Bomber Command Headquarters, where he remained until he went to the Central Bomber Establishment.

Cranwell Passing-out Parade

THE first post-war Passing-out Parade of Cadets (45th Entry) was held at R.A.F. College, Cranwell, on Wednesday, April 7th, 1948. These cadets, who had been granted permanent commissions in the General Duties Branch as pilots, were presented with prizes by Marshal of the Royal Air Force Lord Newall, who took the parade. Attending the parade were: Marshal of the R.A.F. Lord Newall, G.C.B., O.M., G.C.M.G., C.B.E.; Lady Newall and her daughter, the Hon. Georgeana Newall; Air Marshal Sir Brian E. Baker, K.B.E., C.B., D.S.O., M.C., A.F.C. (A.O.C.-in-C. Transport Command), and Lady Baker; Air Marshal Sir William Elliot, K.B.E., C.B., D.F.C. (A.O.C.-in-C. Fighter Command), and Lady Elliot; Air Marshal A. B. Ellwood, C.B., D.S.C., (A.O.C.-in-C. Bomber Command), and Mrs. Ellwood; Air Vice-Marshal Sir Hugh S. P. Walmsley, K.C.I.E., C.B., C.B.E., M.C, D.F.C. (Deputy Chief of the Air Staff), and Lady Walmsley; A. Cdre. A. S. Ellerton, C.B.E., A.D.C. (Director, Personnel Services, A.M.), and Mrs. Ellerton; A. Cdre. R. L. R. Atcherley, C.B.E., A.F.C. (Commandant, R.A.F. College, Cranwell), and Mrs. Atcherley; A. Cdre. Spreckley (Commandant, Empire Air Armament School, Manby) and Mrs. Spreckley.

Air Marshal Sir Brian Baker presented the College with part of the scale plan used to brief crews of 38 and 46 Groups, Transport Command, who dropped the 6th Airborne Division over the River Orne area of Normandy on the night of D-Day minus one. The use of this plan enabled the crews taking part in the operation to pre-select the dropping and landing zones. For the success of the operation, involving about 1,000 aircraft and glider sorties, it was important that crews should know in detail the ground picture from the coast up to and including the run-up. The airborne troops were dropped from the height of 500ft. The plan had been stored at Transport Command Headquarters, and will now prove of considerable value both historical and instructional to the College.

"Flight" photograph.

PRENTICE'S PASSPORT: With its civil registration, this Percival Prentice will leave shortly on a demonstration tour abroad. Note the latest modification to the lower part of the rudder and the elimination of the "bite" above the tailwheel.

The graduation order of merit was: Flight Cadet Under Officer J. E. Y. King (Sword of Honour, King's Medal, Abdy Gerrard Fellowes Memorial Prize, J. A. Chance Memorial Prize, R.U.S.I. Award, *Rowing, Shooting); Flight Cadet Corporal G. M. Hermitage (Dickson Trophy, *Captain of Soccer, Skill at arms); Flight Cadet Sergeant R. L. Tavanyar (*Rowing); Flight Cadet Corporal C. M. Bruce (*Skill at Arms, Shooting); Flight Cadet Corporal H. R. W. Morris (Philip Sassoon Memorial Prize, R. M. Groves Memorial Prize, R.U.S.I. Award, *Rugger, *Cricket); Flight Cadet Under Officer L. S. R. Smith (*Captain of Hockey, *Cricket); Flight Cadet Corporal A. K. McGrigor (Captain of Cross-Country, Captain of Athletics, Photography); Flight Cadet Corporal H. W. Cafferata (Cadet Librarian); Flight Cadet Sergeant C. M. A. Vallance (*Captain of Rugger, Cricket); Flight Cadet Under Officer M. M. J. Robinson (*Captain of Cricket, *Hockey); Flight Cadet Corporal D. B. D. Hamley (Shooting); Flight Cadet Corporal J. W. Morrice (*Soccer); Flight Cadet Sergeant C. F. A. Curtis (Captain of Rowing, Soccer, Shooting).

(N.B.—Asterisk indicates colours.)

Officers did not take part in the parade, which was commanded by an Under Officer with other Under Officers and Cadet N.C.O.s as Subordinate Commanders. These were as follows: Parade Commander, Flight Cadet Under Officer J. E. Y. King; Parade Warrant Officer, Flight Cadet Sergeant C. M. A. Vallance; Squadron Commanders: "A" Squadron, Flight Cadet Under Officer L. S. R. Smith; "B" Squadron, Flight Cadet Under Officer M. M. J. Robinson; "C" Squadron, Flight Cadet Sergeant R. L. Tavanyar.

The parade ground was lined by Cadets of "D" (Initial Training) Squadron and from the Equipment and Secretarial Wing, Digby.

Famous Yorks

THE careers of two of the most famous aircraft in the R.A.F. are ending. The machines are Avro Yorks MW100 and MW101 of Transport Command, which between them have flown about half a million miles in all parts of the world, carrying hundreds of V.I.Ps. Handley Page Hastings, one of which is now on an overseas proving flight, will replace all Yorks in the R.A.F., and will eventually be used for the specialized V.I.P. work now performed by MW100 and MW101.

Both Yorks were delivered to the R.A.F. in November, 1943—MW 100 for the use of the Cabinet and MW101 for the Chiefs of Staff. MW100's first major task was to carry Marshals of the R.A.F. Lord Portal and Lord Tedder, Field-Marshal Lord Alanbrooke, Admiral of the Fleet Lord Cunningham and other passengers to the Cairo and Teheran conferences that month. MW101 started its service life by flying Field-Marshal Smuts to North Africa. Many other V.I.P. flights followed in subsequent months, and the next major task for both machines was the Moscow Conference of November, 1944. MW100 carried Mr. Churchill and Mr. Eden, while among MW101's passengers was Mr. Mikolajczyk, then Polish Prime Minister.

In February, 1945, came "Operation Argonaut"—the Yalta Conference—and MW 100 and MW 101 were once again performing what was by now almost their routine task. Mr. Churchill this time used the Skymaster given to him by Mr. Roosevelt, and MW 100 carried Marshal of the R.A.F. Lord Portal and Field-Marshal Lord Alanbrooke and others. Passengers on MW 101 included Field-Marshal Viscount Alexander, Generals Ismay and Laycock, and Lord Leathers. The next major operation was the Potsdam Conference in July, 1945, and both aircraft shuttled to and from Berlin with many distinguished passengers.

After the war the two Yorks were just as busy. Many members of the Cabinet have used them during the past three years on flights to Europe, Africa, the Middle and Far East, and Canada. A notable post-war flight by MW 101 was that to the Far East, Australia and New Zealand by Field-Marshal Montgomery in June, 1947. He used the same aircraft for his Moscow visit in January of that year. MW 100 was used by the Secretary of State for Air, Mr. Arthur Henderson, when he flew to Burma in December last to attend the Burmese Independence celebrations, as British Government representative.

In accordance with R.A.F. practice, MW 100 and MW 101 have never been named. They have changed their squadrons several times, and their colour once. During the war they were camouflaged as operational aircraft, but at the end of hostilities they were stripped to their polished aluminium finish. They now belong to No. 24 (Commonwealth) Squadron.

THE COLLEGE OF AERONAUTICAL AND AUTOMOBILE ENGINEERING

(of Chelsea)

Complete practical and technical training for entry to Civil and Commercial Aviation or the Automobile Industry.
Entry from School-leaving age.

Syllabus from Bursar

COLLEGE HOUSE,
Princes Way, Wimbledon Park, S.W.19
Telephone : PUTney 4197

Offkwik

THE WORLD'S LEADING PAINT REMOVER

PAINT REMOVERS LTD

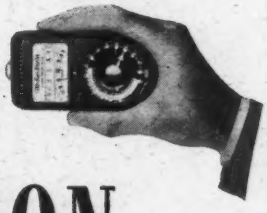
24 Ryder St. St James. London. S.W.1. Abbey 4161 (5 lines)

Blind Approach

It's an interesting photograph... Quite apart from the humorous angle, the baby's white blouse and the black hat represent extremes in light values. To make a "blind approach" at the exposure for such a picture by guessing would probably result in failure. The best way to ensure correct exposures is to use a Weston "Master" Exposure Meter. It will give you the correct f/stop and exposure time for all your photographs in an instant and will save you time, trouble and money. The Model S74/715 "Master" meter combines the high sensitivity and the dependability for which Weston is world-famous. Please ask your dealer for details.

P.S. If you want a blind approach landing indicator, we make those too, and a very wide range of the finest electrical instruments available for precision measurements.

Model S74/715
Price £9.15.3
(including purchase tax)
Leather Case 27/8 extra



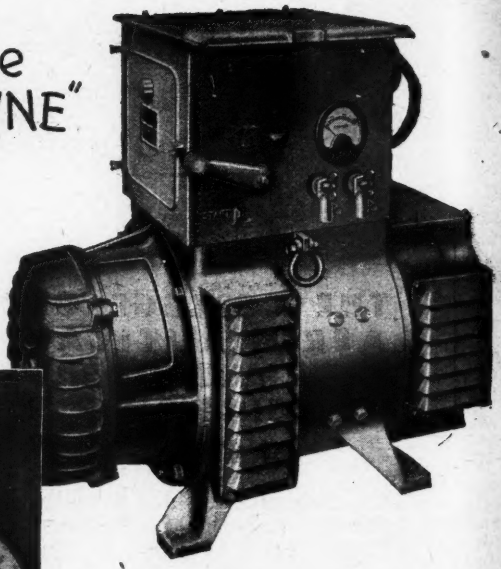
WESTON *Master*

UNIVERSAL EXPOSURE METER

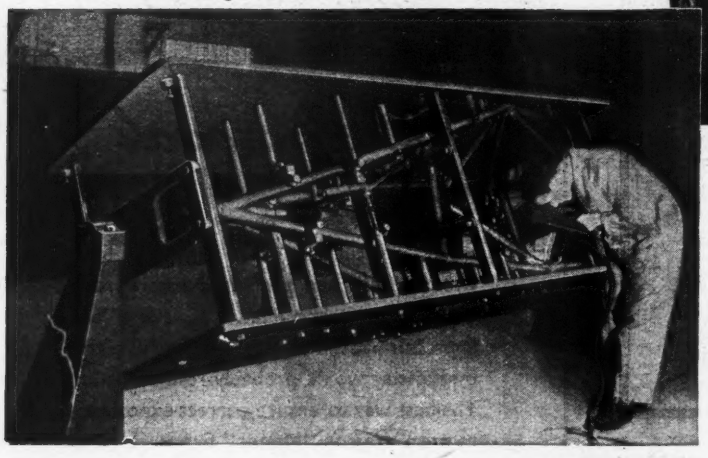
SANGAMO WESTON LIMITED
Great Cambridge Road, Enfield, Middlesex
Telephone: Enfield 3434 & 1242

Speed up the production line by welding with the "PARADYNE"

The Metrovick "Paradyne" D.C. arc-welding set is faster and has better penetration with less distortion than the oxy-acetylene method. Where accuracy and strength are required in light tubular steel construction, as in aero engine mountings, the solution is provided by the "Paradyne."



Welding an outboard sub-frame in rotating jig.



Ask for illustrated leaflet 78.3/16-1.

METROPOLITAN Vickers
ELECTRICAL CO., LTD.
TRAFFORD PARK ··· MANCHESTER 17.
J/ES03

605.23 M.P.H.

100 km. International closed circuit record by De Havilland 108.
(Subject to homologation)

IN this supreme test both of manœuvreability and speed, the Mollart Engineering Co. Ltd. has made its contribution. The Differential Control Gear Box was made by this Company. This unit and the main control column incorporate Patent Universal Joints—proof of the high strength, weight ratio and precision of Patent Universal Joints and of this Company's ability to satisfy exacting requirements in the making of precision aircraft mechanisms.

Catalogue and Technical Advice on request.

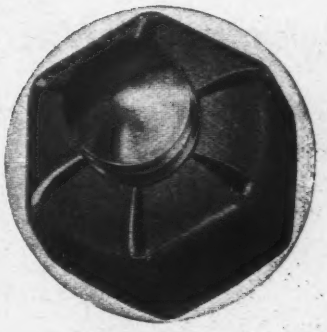
THE MOLLART ENGINEERING CO. LTD.
KINGSTON BY-PASS, SURBITON, SURREY
'Phone : Elmbridge 3352/3/4/5 *'Grams :* Precision, Surbiton.

AIR MINISTRY GAUGE TEST HOUSE AUTHORITY No. 89755/31

By reason of the embodied resilient tongues maintaining a 'stress-tight' grip on the thread of a bolt, an ODDIE Nut remains firmly anchored in position in spite of coercion by vibration, heat or oil. One-piece construction means no internal or external attachments to work loose or disintegrate. Its efficiency is not impaired by adjustment or repetitive use. Full details gladly sent on request.

A.M. Approved Serial Nos. 1296 and 1297

Patent Nos. 513344 & 551214



Oddie NUTS

MAXIMUM FASTENING EFFICIENCY without auxiliary locking devices

Brown Brothers (AIRCRAFT) Ltd
AIRCRAFT AND GENERAL ENGINEERS
HOUGHTON ROAD NORTHAMPTON

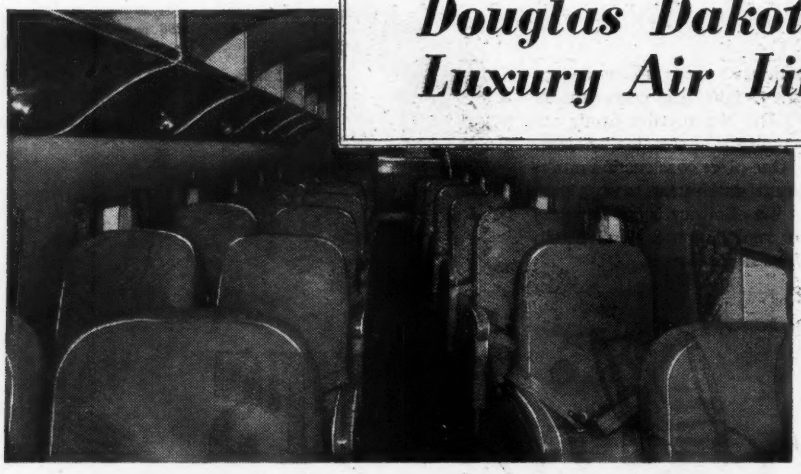
CHOSEN BY "Bristol" FOR THE NEW TYPE 170

To supply power to 'George,' the Automatic pilot, the Integral electric motor-driven hydraulic pump Unit, Type 114, is used on the Bristol New Type 170 (1948 Freighter)

INTEGRAL LTD
AN ASSOCIATED COMPANY OF H. M. HOBSON LTD.
COUSINS STREET,
WOLVERHAMPTON
Telephone: Wolverhampton 24984/6
WE INVITE YOUR ENQUIRIES

INTEGRAL TYPE 114 UNIT

Douglas Dakota becomes Luxury Air Liner . . . .



Scottish Aviation C.47 Conversions are operated with conspicuous success by leading Airline operators. We are the authorised Douglas repair, overhaul and conversion centre for Great Britain and were the pioneers in Europe in this class of work. Freighter and passenger conversions are usually available from stock.

Scottish Aviation are fully equipped to undertake the overhaul of all aircraft, including airframes, engines and ancillary equipment. We have a fully approved Inspection Department and our manufacturing and servicing experience is at your disposal. We welcome any enquiry relating to aircraft conversions, repairs, annual C. of A. or any other servicing matter.

C.47 Passenger and Freighter Conversions available from stock.

Scottish Aviation Ltd.

PRESTWICK AIRPORT • SCOTLAND.

TELEPHONE · PRESTWICK 7272 · 9 LINES

Agents for Pakistan, Indian Union, Burma and Ceylon, Messrs. R. K. Dundas Eastern Ltd., Jehang'r Buildings, 133, Esplanade Road, Bombay.
Cables: Dundeast, Bombay. 'Phone: Bombay 27024/5.

IN THESE WE SERVE

Automobile and Aircraft Services Ltd.

A and A SERVICES

Byron House, St. James's St. London W1 Whitehall 9515

ANY MAKE OF AIRCRAFT SUPPLIED AND SERVICED

AUTHORISED RETAIL DEALERS IN PRODUCTS OF THE ROOTES GROUP

B91

BIRSO TRADE MARK

AMALGAMATION

The old established non-ferrous foundries of T. M. Birkett & Sons, Ltd., of Hanley, and Billington & Newton Ltd., of Longport, have pleasure in announcing that they have joined forces and by pooling their resources and technical experience can now offer to new and former customers of each firm an even more complete service than in the past.

T. M. BIRKETT & SONS Ltd.
HANLEY
'Phone: Stoke-on-Trent 2184-5-6. 'Grams: "Birkett, Hanley."

in association with

BILLINGTON & NEWTON Ltd.
LONGPORT
STOKE-ON-TRENT
'Phone: Stoke-on-Trent 87303-4. 'Grams "Bronze, Phone, Longport."

A.I.

Comprehensive in range... standardised in all British Service aircraft... recognised by the aircraft industry as the highest standard.

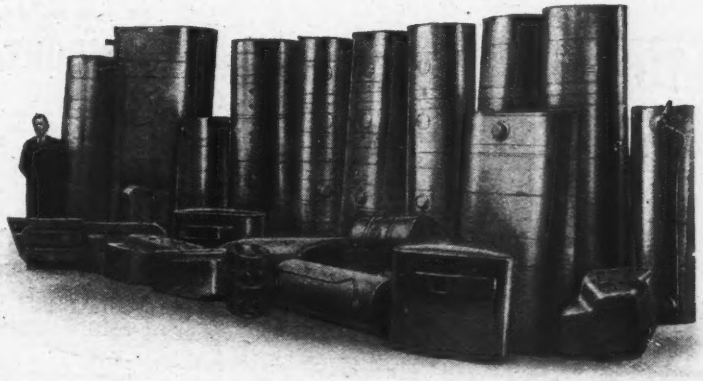
HYMATIC EQUIPMENT PROVIDES

Air Compressors; Automatic Regulators; Oil and Water Traps; Relief Valves; Anti-freeze System; Pressure Maintaining Valves; Reducing Valves; Emergency Air Valves; Non-return Valves; Shuttle Valves; Emergency Air Release Mechanism; Air Reservoirs; Engine Primers (manual); Engine Primers (automatic); Undercarriage Selectors; Flap Selectors; Restrictors; Flap Rams; Nose Wheel Rams; Main Wheel Rams; Hot Air Intake Rams; Radiator Flap Rams; Carburettor Control Rams; Ground Charging Connections.

RESEARCH · DEVELOPMENT · PRODUCTION

Produced by the Aviation Division of
THE HYMATIC ENGINEERING COMPANY, LTD., REDDITCH, WORCESTERSHIRE, ENGLAND.
Telephone: Redditch 743.

EVERYTHING IN SHEET METAL WORK
AND LIGHT ENGINEERING



AIRCRAFT
AUTOMOBILE
COACH AND BUS BODIES
Municipal and other ALL-METAL Vehicle Bodies

Refrigeration
COLD STORAGE
HEATING
DRYING
AIR Conditioning
MINING

TELEGRAMS: BROMELPAR, SOUTHTOT. LONDON
161 West Rd., TOTTENHAM

E. G. Brown & Co. Ltd

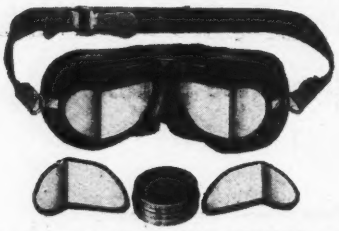
TELEPHONES: TOTTENHAM 2257, 2258 & 2259
LONDON, N.17

FLIGHT

CLASSIFIED ADVERTISEMENTS

Prepaid Advertisement Rates: 3/- per line, minimum 6/-, average line contains 6-7 words. Special rates for Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders, 4/- per line, minimum 6/- per paragraph. Box Number facilities available for the convenience of private advertisers, add 2 words plus 1/- to defray the cost of postage and forwarding replies. Press day, FIRST POST THURSDAY, or one day earlier at Branch Offices. No responsibility accepted for errors. Remittances payable to: Flight Publishing Co. Ltd., Dorset House, Stamford Street, London, S.E.1.

FLYING EQUIPMENT



Brand new ex-R.A.F. wide vision **GOGGLES**, complete with spare lenses, **22/6**. Luxor goggles, **50/-**, Triplex goggles, **7/6**, with spring head band, **12/6**. Tan leather chamois-lined flying helmets, **27/6**.

Black or Tan Lumber or three-quarter style LEATHER JACKETS. Write for list.

Brand new **R.A.F. KAPOK INNER SUITS**, fully zipped, **28/6**. Coupon free **DUFFLE COATS** from **55/-**. Reconditioned Lambswool Lined **ex-R.A.F. FLYING BOOTS**, Black-calf Leather Uppers, with waterproof canvas tops, at **75/-**; **ex-R.A.F. ESCAPE BOOTS** with black suede tops, zip fasteners, at **80/-**. ALL BOOTS COUPON FREE.

Fur and sheepskin lined **FLYING JACKETS** and **TROUSERS** now in stock at reasonable prices. ALL are COUPON FREE. Write, call or 'phone for particulars.

All goods are sent POST FREE unless otherwise stated.

QUICK SERVICE, SPECIAL TERMS TO FLYING CLUBS—SECRETARIES, WRITE FOR PARTICULARS NOW.

Illustrated list on receipt of 1d. stamp. Trade supplied

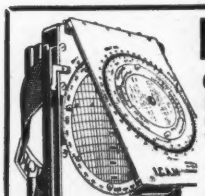
D. LEWIS LTD. (Dept. F.)

Leather Clothing Manufacturers for Home or Export

124, GT. PORTLAND ST., LONDON, W.1

Trade Enquiries Invited

Tel.: Museum 4314. Tele.: Aviakit, Wesdo, London



DALTON COMPUTORS

Mk. IIID* I.C.A.N.

Pilot Navigator Type, with Knee Attachment and Log.

50/-NEW

(Postage 1/-)

SMITH'S 8-DAY AIRCRAFT CLOCK **65/- ea.**

Spigot wound, in Brass Case. (Postage 1/-)

Government Surplus.

AERO-SPARES CO., (Government Contractors)

Aero Warehouse: 69 Church St., Edgware Road, London, N.W.8. A.M. Bassador 4856

AIRWORK LIMITED

AIRWORK, Ltd., has completed negotiations with B.E.A whereby it becomes the sole selling agent for the fleet of redundant DH 89 aircraft recently operated by B.E.A.

AIRWORK, Ltd., still have available for delivery early this year a number of De Havilland Doves, a limited number of second-hand Airspeed Consuls, Miles Aerovans and Gemini aircraft, all with C. of A.s; delivery date for the De Havilland Doves is earlier than De Havillands themselves can undertake.

ENQUIRIES invited to Airwork, Ltd., Sales Division, 15, Chesterfield St., London, W.1. Tel. Grosvenor 4841. [0407

FIELDS

THE abolition of the foreign travel ban and the return of basic petrol makes the ownership of a private aircraft, either for business or pleasure, an attractive proposition; the Proctor aircraft offers a high degree of pilot and passenger comfort, and a cruising speed that makes it worth while travelling by air; we have pleasure in offering the following Proctor aircraft, fully equipped with blind flying instruments and all in excellent condition.

£1000—Proctor I, 3 seats, finished silver with blue flash, grey upholstery, engine hours 91, since complete, delivery 2 weeks.

£1300—Proctor V, airframe and engine hours under 400, dual control, C. of A., 27th August, 1948; delivery immediate.

£1450—Proctor V, long range tanks, engine and airframe hours under 550, 12 months C. of A.; delivery 4 weeks.

£1600—Choice of 2 Proctor Vs, engine and airframe under 350 long range tanks, 12 months C. of A.; delivery immediate.

ALL the above Proctor Vs are finished silver with red flash; all essential engine modifications have been carried out including 969 and 1044, giving an engine life of 750 hours.

FROM £1,750, Proctor IVs completely converted, painted and upholstered to customer's requirements; a really personal aircraft.

WRITE or telephone Field Aircraft Services, Ltd., Croydon Airport, Surrey. Tel. Croydon 7455. Cables, Fieldair, Croydon. [0258

AVIATION TRADERS, LIMITED.

HALIFAX freighters with 12 months C. of A. for immediate delivery with unlimited spares; enquiries invited for all types of aircraft, spares and equipment.—Aviation Traders, Ltd., 78, Buckingham Gate, London. Tel. Whitehall 8738. [1575

MILES Gemini.

NEW, complete with metal propellers, finished silver, 12 months' C. of A., can be fitted with wireless and full night flying facilities; other aircraft taken in part exchange.

PATRICK-DUVAL AVIATION, Ltd., 34, Paradise St., Birmingham, 1. Mid. 3954. [0396

KENNING AVIATION, Ltd.,

FOR immediate delivery of Austers, Proctors, Aerovans, Geminis, Messengers and Dragon Rapides. Ring or write:—

KENNING AVIATION, Ltd., Derby Airport. Tel. Etwall 123-4. [0235

AIRCRAFT FOR SALE

FIRST PLACE COURSES

FORTY FIRST PLACES now gained by T.I.G.B. students in the Royal Aeronautical Society's examinations—an unapproached record. Write today for The T.I.G.B.'s great guide which shows the way to technological success in the branches and professions of engineering and aeronautics. Chosen T.I.G.B. courses, which are the best, for **A.F.R.Ae.S., A.M.I.Mech.E., A.M.I.E.E., Ground Engineer's Licences, etc.**

The Professional Engineering & Aeronautics Tutors,

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN,

37, TEMPLE BAR HOUSE, LONDON, E.C.4

OPPORTUNITIES

IMPORTANT GUIDE

This unique handbook, "Engineering Opportunities," outlines over 200 Courses of technical instruction, including **Aeronautical Engineering, Aeronautical Design, Aero Engines, Air Navigation, Aircraft Engineers' Licences (Ground Engineers), A.F.R.Ae.S., A.M.I.Mech.E., R.A.F. Maths.,** etc.

Our Courses have been approved by the **Royal Aeronautical Society** and

WE GUARANTEE

"NO PASS—NO FEE"

A copy of this enlightening guide to well-paid posts will be sent on request—**FREE.**

BRITISH INSTITUTE OF ENGINEERING TECHNOLOGY

306, Shakespeare House, 17-19, Stratford Place, London, W.1

TIME LAGS

Bar Repetition Products made specially to Air Ministry Requirements

to the specific requirements of our customers.

STEADY PINS

Makers of all types of repetition products from the bar in all metals.

M-C-L AND REPETITION LTD Pool Lane · Langley · B'ham.

Phone: BROadwell 1115 (4 lines) and 1757. Grams: "KARLYTEKO, LANGLEYWORCS"

AIRCRAFT FOR SALE

AIR Speed Consul.

FINISHED blue, 12 months' C. of A, air frame 408 hours, engine 435 hours, fully tropicalised sun blinds, full blind flying instruments, full str. radio, six passenger seats, cabin heating and door between passengers and crew, full navigation lights, landing lights, the aircraft new in Jan. 1947: part exchanges considered.
PATRICK-DUVAL AVIATION, Ltd., 34, Paradise St., Birmingham, 1. Mid 3954. [0380
T. SHIPSIDE, Ltd.

NOW offer to flying clubs and private owners the following aircraft at attractive prices.
TIGER MOTH.

TOTAL aircraft hours, 402.05; C. of A. expires, new; colour, silver and blue; price, £525.
TIGER MOTH.

TOTAL aircraft hours, 1,985.10; C. of A. expires, 3-9-48; colour, silver and red; price, £525.
AUSTER AUTOCRAT.

TOTAL aircraft hours 45; C. of A. expires, 1-6-48; colour, silver and green; price, £1,100.
AUSTER AUTOCRAT.

TOTAL aircraft hours, 170.35; C. of A. expires, new; colour, cream and red; price, £800.
AUSTER V. (Lycoming engine).

TOTAL aircraft hours, 357.35; C. of A. expires, 12-11-48; colour, silver and black; price, £600.
AUSTER J.4.

TOTAL aircraft hours, 20.00; C. of A. expires, new; colour, silver and red; price, £650.
FOR full details phone, write or call:—
T. SHIPSIDE, Ltd., Nottingham Airport, Tollerton, Notts. Tel. Nottingham 89692. [1680
R. K. DUNDAS, Ltd.

ARE you ready for the flying season? We can offer a large variety of aircraft.
AIRCRAFT available include:—

AUSTER Autocrats, which have proved their way with flying clubs and private owners; have you had full particulars of this versatile aircraft?
AIRSPEED Consuls, the ever popular charter aircraft which has been the "back-bone" of many charter firms since the war.
ERCOUPE, available now subject to import licence being granted, price approximately £1,500 plus duty.
ALSO:—

MILES Messengers.

AUSTER Arrows.

PERCIVAL Proctors.

AVRO XIXs.

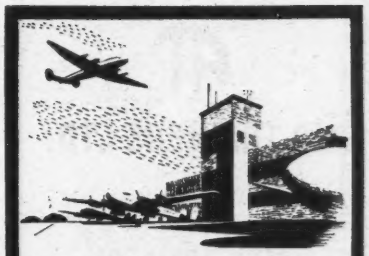
WE are getting a large demand for aircraft of all types for home and overseas markets, we invite sellers to communicate with us.
R. K. DUNDAS, Ltd.,

AVIATION Division: 4, St. James's St., London, S.W.1. Whitehall 2848. Head Office: The Airport, Portsmouth. Portsmouth 74874. [0212
HERTS & ESSEX AVIATION, Ltd., Broxbourne Aerodrome, Nazeing, Essex.
LIGHT aircraft for sale and wanted, enquiries welcomed. Ring Hoddesden 3180. [0818
LINK Trainer, overhauled and ready for immediate use.—Box 6438. [1587
W. S. SHACKLETON, Ltd., the biggest dealers in used aeroplanes in Europe.
BUY Aeroplanes.

SELL Aeroplanes.

SWOP Aeroplanes.

ALREADY this year we have sold and delivered aircraft of the following types and in some cases as many as three, five and even six of each; Dakota, Lockheed 14, Anson, Rapide, Tiger Moth, Magister, Proctor, Bonanza, Globe Swift, Auster V, Auster Autocrat, Fairchild Argus, Cygnet, Walrus, Mohawk, Gemini, Aerovan, etc.
WE have a lot left where the above came from!!!
W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Tel. Regent 2448-9. Cables: Shackhud, London. [0070
DH. RAPIDE, 8 seats, 12 months C. of A., low hours, excellent condition; £3,700.—Box 7026. [1676
£750.—Auster V, C. of A. March, 1949, b.f. panel, nav. lights, etc.—Sturrock, Grand Hotel, Lincoln. [1678
MILES Gemini, airframe hours 276, engine hours 288, full blind flying instruments, finished blue and gold, 12 months C. of A.
HORNET Moth, total airframe hours 790, total engine hours since complete overhaul 108, full year's C. of A., finished silver and blue, blue leather upholstery; this aircraft was the personal property of Lord Londonderry and is in magnificent condition.
MILES Falcon, total airframe hours 670, since last C. of A. 120, total engine hours since complete overhaul 131, this aircraft specially built for an aircraft company director and has latest type blown windscreen, in perfect condition; can be seen at Messrs. Miles Aircraft, Ltd., Reading.
APPLY Ulster Aviation, Ltd., Newtownards Airport, Co. Down, N. Ireland. [1726
AUSTER Autocrat, approximately 50 hours, complete with starter sensitive altimeter, battery dual control, finished cream and red leather, part exchange is considered.
PATRICK-DUVAL AVIATION, Ltd., Paradise St., Birmingham, 1. Tel. Midland 3954. [0821



BRITAIN'S AIR UNIVERSITY

AIR NAVIGATION

FULL AND CONVERSION COURSES FOR NEW FLIGHT NAVIGATOR'S LICENCE and COMMERCIAL AND AIRLINE TRANSPORT PILOT'S LICENCES

Special Courses in individual subjects to suit requirements.

Details from the Commandant.

AST

Branch of the Hawker Siddeley Group.

AIR SERVICE TRAINING

HAMBLE · SOUTHAMPTON

A.S.T. 15

Aero & Jig & Tool Draughtsmen in Great Demand

MEN AND YOUTHS

There is an insatiable demand for Aero, Jig and Tools, etc., Draughtsmen and Inspectors. So acute is the present shortage that employers are only too anxious to engage those with no previous practical experience who are able to prepare neat and accurate drawings.

QUALIFY AT HOME—IN SPARE TIME

After brief, intensely interesting study—undertaken at home in your spare time—***YOU*** can secure an attractive and interesting post as **Aero-Draughtsman**. Numerous vacancies are also available in **Electrical, Mechanical, Plastics,** etc., branches of Draughtsmanship.

FREE GUIDE

The Free Guide contains 132 pages of information of the greatest importance to those seeking such success compelling qualifications as **A.M.I.Mech.E., A.F.R.Ae.S., A.M.I.P.E., A.M.I.E.E., Matric. and B.Sc.,** etc., also **R.A.F. Entry** (Maths., etc.), together with particulars of our remarkable Guarantee of

SUCCESS—OR NO FEE

Write now for your copy of this remarkable publication. It may well prove to be the turning point in your career.

NATIONAL INSTITUTE OF ENGINEERING

(Dept. 427), 148-150, HOLBORN, E.C.1

(South Africa Branch E.C.S.A. P.O. Box 8417, Johannesburg.)

AIRCRAFT FOR SALE

MAGISTER aircraft; time since overhaul for C. of A. and complete rebuild, 1hr 20min; £325.
MAGISTER aircraft at present undergoing overhaul for C. of A., completely rebuilt; £350.
THREE Mark V Lycoming engine Austers, 3-seater, £650; each with 12 months C. of A.
SIX Magister aircraft without C. of A., but ready to fly; £250 each.
THE WILTSHIRE SCHOOL OF FLYING, Ltd., Thruxton Aerodrome, nr. Andover, Hants. [1727
£395.—Avro Prefect 2-seater, in first-class condition, 7 months C. of A., any trial or inspection, cruises at 110 m.p.h.—Box 7029. [1684
AIRCO, Ltd.—Suppliers of aircraft; export enquiries invited.—109, Jermyn St., London, S.W.1. Tel. Aerosup, Piccy, London. 'Phone: Whitehall 8863. [0312
AUSTER-TAYLORCRAFT Plus Model D, side-by-side 2-seater; 12 months C. of A., dual control, repainted; 90hp Cirrus Minor engine; offers invited —Box 6437. [1586
£2500.—Consul, 12 months C. of A., standard 16/17 radio; valuable range spares; one month delivery; offers considered; must be sold.—Box 7232. [1742
WHITNEY STRAIGHT.—Built 1937, 6 months C. of A., in excellent condition, reupholstered, resprayed, etc.; can be seen Berkshire; what offers?—Reply Box 7204. [1738
VEGA Gull, 4-seater, ½ hour test flight since Certificate of Airworthiness, full panel blind flying instruments and new lights, self-starter, brakes, etc., blue and silver; £1,250.
130HP Auster V Lycoming, 11 months Certificate of Airworthiness, dual control, brakes, flaps, full blind flying panel and navigation lights, 3-seater, red and silver; £825.
90HP Auster, 2-seater cabin, green and silver, dual control, brakes, etc., new Certificate of Airworthiness; £465.
80HP B.A. Swallow, low-winged monoplane, 3 months Certificate of Airworthiness, beautiful aircraft 4 gallons per hour; £465.
CARS and aircraft taken in part exchange.

STRATHMORE MOTORS. Perth 2158. [1724

AVIATION Department of Autowork (Winchester), Ltd., offer the following aircraft, etc.; immediate delivery; aircraft or cars in part exchange, hire purchase facilities available.
RAPIDE, Gipsy Queen III engines, completely overhauled, C. of A. to May 1949, radio, etc.; as new throughout.
ANSON, civil conversion 6-passenger seats, 2 crew, airframe and engine hours all approximately 550; unused since conversion and almost 12 months' C. of A.
DH DRAGON, Gipsy Major engines, exceptionally economical, 7-passengers, 2 crew, nearly 12 months' C. of A., radio, etc.
DH PUSS-MOTH, Gipsy III engine, high-wing cabin monoplane, folding wings, 3 seats, full dual, magnificent condition, C. of A. to April 1949.
SPARES for Leopard Moth, Puss Moth, Anson, etc.; Cheetah IX engines, etc., etc.
AUTOWORK (WINCHESTER), Ltd., Station Hill, Winchester. Tel. Winchester 4834 and 3406. [1737
TIGER MOTH, completely overhauled, 12 months C. of A., colour grey and red, immediate delivery; £550.—Laygold & Co., Blackbushe Airport, Camberley, Surrey. Tel. Yateley 3259. [1723
£800.—Auster Autocrat, metal propeller, silencer, D.I., etc., very clean machine; demonstration any time.—Apply K. E. Millard & Co., Ltd., Oldbury, Worcs. Tel. Broadwell 1233. [1721
AUSTER Autocrat, latest type, only 25 hours flying from new spotless condition, very smart with many valuable extras; cost £1,360, bargain £1,050 with 12 months C. of A.—Owner, Austin House, Gerrards Cross. Tel. Gerrards Cross 2077. [1654
PROCTOR V, finished silver with red flashes and red leather upholstery, full blind flying instruments and navigation lights, sun blinds, approximately 425 engine frame hours, C. of A. due end of July, part exchange is considered or can offer at very low cash basis.
PATRICK-DUVAL AVIATION Ltd. Paradise St., Birmingham, 1. Tel. Mid. 3954. [0820
MILES Gemini, £1,200 less than list price; fitted with 2 brand new unused engines, 12 months' C. of A. by makers, airframe 90 hours, including Murphy VHF radio, full Sperry blind flying panel, metal propellers, landing and navigation lights, sunblinds, sensitive altimeter, also R. and S. turn and bank indicator, rate climb indicator, slats, air log, clock, etc.; ready to fly away; only test flown since C. of A.; owner purchasing new aircraft; price £3,200. —The Owner, Hawk's Hill House, Bourne End (Tel. 755), Bucks. [1605

AIRCRAFT WANTED

AIRCRAFT of all types and sizes for resale. Should you wish to sell or part exchange your aircraft, send us full particulars.
W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Tel. Regent 2448-9. Cables: Shackhud, London. [1711
REQUIRED for immediate delivery, 2 Yorks and 2 Skymasters.—Please send full details to Aeronautical & Industrial Research Corp., Ltd., 3, Seamore Place, Curzon St., London, W.1. Tel. Gro. 4508. [1733

AIRCRAFT ACCESSORIES AND ENGINES

MISR AIRWORK, S.A.E. Almaza Airport, Heliopolis, Egypt.
OFFER for immediate delivery of new and serviceable:—
SPARE parts, components, accessories, propellers, instruments, radio sets, tools, equipment, etc., for AVRO XIX aircraft and Cheetah XV engines; Avro X and Cheetah IX engines and D.H.86. [1665
COMPLETE Anson XII in good condition less engines, available as spares, most parts interchangeable with Anson XIX.—Laygold & Co., Blackbushe Airport, Camberley, Surrey. Tel. Yateley 3259. [1722

AIRCRAFT ACCESSORIES AND ENGINES

AVIATION TRADERS, LIMITED

SPECIAL offer—A large quantity of new and unused American aircraft radio breakdown spares, including Command, BC348, radio compass and altimeter—Write, call or phone for inspection. AVIATION TRADERS, Ltd., 78, Buckingham Gate, London, S.W.1. Tel. Whitehall 8738. [1690

SEVERAL Lycoming 125hp engines 0-290-3 available for immediate delivery; engines have not been used since complete overhaul and are complete with log books; price complete in case £235 each, delivered free.—Chrislea Aircraft, Ltd., Exeter Airport, Devon. [1685

BENDIX Scintilla magnetos (60), type SF14LN-4, in original cartons; control cables (4,000), 3/16in various lengths, individually wax packed; flexible drives (900), 2ft, armoured casings; liftbags, instruments, tyres, tubes, etc.; attractive wholesale prices.—des Baux, 73, Kyoto, Bognor. Tel. 1570. [1718

AIR CHARTER

WANTED to hire, light aircraft fitted F.24 camera mounting for oblique photography.—Box 7073. [1705

MORGAN AVIATION, Ltd., Cowes Airport, Isle of Wight, for air taxis and freighting to all parts of British Isles and Europe.—Tel. Cowes 535. [0411

BROOKLANDS AVIATION Ltd.—Proctors and Rapides available for air charter at Brooklands Aerodrome, Weybridge (Tel. Byfleet 436), Sywell Aerodrome, Northampton (Tel. Moulton 213511); Shoreham Airport, Sussex (Tel. Shoreham 2366). [0306

AIRCRAFT SERVICING

AIRWORK LTD.

AIRWORK, Ltd., branches are available for renewal of your certificate of airworthiness—contact: 134, Bath Rd., Hounslow, telephone number Hounslow 5451. [0389

BROOKLANDS AVIATION, Ltd., Brooklands Aerodrome, Weybridge.—C. of A. overhauls, modifications and conversions. Tel. Byfleet 436. [0305

REPAIRS and C. of A. overhaul for all types of aircraft.—Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton. Tel. Moulton 3251. [0307

CONTACT WESTERN AIRWAYS, Ltd., Weston Airport, Weston-Super-Mare, for estimates, C. of A. overhauls, repairs, servicing all types aircraft and gliders. Area agents for Percival Aircraft and Slingsby gliders.—Tel. Weston-Super-Mare 2700. [0815

C. OF A. Overhauls.—The lowest charge for efficient work; let Somerton Airways undertake the C. of A. on your Auster at an average quotation of £35-£40.—Somerton Airways, Ltd., Cowes Airport, Cowes 535. [0303

IMMEDIATE capacity for engine and aircraft overhauls and renewals of C.s of A. on large or small wood or metal aircraft; Halifax and Dakota conversions a speciality; special consideration given to private owners, flying clubs, etc.; estimates free.—C. L. Air Surveys, Ltd., The Airport, Doncaster. Tel. Doncaster 55439. [0365

AERONAUTICAL ENGINEERS AND AGENTS

R. K. DUNDAS, Ltd.—Aeroplanes, engines, aeronautical equipment and accessories agents at home and abroad for the Aircraft and Allied Industries; branches and agents throughout the world.—Head Office: 4, St. James's St., S.W.1. Tel. Whi. 2848. [0215

BOATS FOR SALE

W. S. SHACKLETON, Ltd., Marine Department, have the answer to a shortage of petrol—Sailing Dinghies! from 10 to 14 feet, new and secondhand, complete with all gear and actually in stock. Should petrol return we have British Seagull outboard engines— the answer to a shortage of wind. Faced with this indecision we trust the wise man will equip himself accordingly and consult us about both. W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Tel. Regent 2448-9. Cables: Shackhud, London. [1710

CAR and COACH HIRE SERVICE

MOTOR coaches 24-hour service, airports, Continental travel, private charter — Stockland Coaches, Erdington, Birmingham. Tel. Erd. 1189-0703. [0398

CELLULOSE

CELLULOSE, auto and industrial grades, synthetics, flock, decorative paints, upholstery cellulose, strippers, etc.; cat. 1d. Goods despatched same day; plant hired.—Leonard Brooks, Harold Wood, Essex. Ingrebourne 2560. [0383

FINEST quality motor cellulose goods and commodities, also spraying equipment, immediate delivery, satisfaction guaranteed; also Nuagane marvellous upholstery leather dye, 30/6 quart tin nett; all colours. —Excel Motor Co., 445, Waterloo Rd., Blackpool. [0364

CONSULTANTS

WING COMMANDER R. H. STOCKEN, F.R.Ae.S., Eagle House, 109, Jermyn St., London, S.W.1. Tel. 8863 [0819

CONSULT Geoffrey Dorman, Airco, Ltd., 109, Jermyn St., London, S.W.1; details of all aviation facts, history, records, etc.; articles written for house organs, etc.; fees according to research involved. [1552

AIR TRAINERS LTD.

MANUFACTURERS OF

LINK TRAINERS

(Sole Licensees for the British Empire)

AND OF THE

MILES MOTOR DRIVING TRAINER

SPECIALIST TRAINING DEVICES FOR ALL PURPOSES

BICESTER ROAD
AYLESBURY
TEL: 1185

AIRCRAFT AND ENGINEERING — SERVICES LIMITED —

CROYDON AIRPORT

Deal with the people with 30 yrs. aircraft experience.

FOR SALE:—

DAKOTAS	Choice of four	With or without Certificates of Airworthiness.
RAPIDES	Choice of four	
TIGER MOTHS	Choice of eight	
PROCTORS	Choice of five	
MAGISTERS	Choice of two	

ENGINES

We have in stock a large number of:—
GIPSY VI MAJOR. QUEEN I II, III. } All as new.
CHEETAH IX, X, XIX. }

We arrange confidentially the best hire purchase terms in the Aircraft Industry.

'Phone: CROYDON 4284-6446-7744 extns. 36 & 208.

TRANSFERS FOR AIRCRAFT

Squadron Crests. C.O.s please note.
Clubs and Charter Firms. Badges or Trade Marks.
Manufacturers. Attractive designs for new types.

Details and specimens on request.

THE BRITISH TRANSFER PTG. CO., LTD.
'Phone COVENTRY. 4021

The . . .
British Air Line Pilots' Association
SUITE 6, 9-10, MARBLE ARCH W.1
Tel.: AMBassador 1357

Membership open to all Commercial and Service Pilots. For full details as to objects and particulars of Membership please write to Secretary.

BOYES, SEGRAVE & CO. LTD.

WE HAVE A LARGE NUMBER OF BRITISH AND AMERICAN AIRCRAFT FOR SALE AT COMPETITIVE PRICES.

69-70, PICCADILLY, LONDON, W.1.
Phone: **Regent 3363**

AUCTIONS

G. R.

BY ORDER OF THE MINISTER OF SUPPLY.
WITHOUT RESERVE.
M.O.S. DEPOT NO. 55,
WESTON-SUPER-MARE,
SOMERSET.

PERCY PALMER, F.A.I.,

are instructed to SELL BY AUCTION in LOTS at the above Depot on
MONDAY, TUESDAY, WEDNESDAY, THURSDAY and FRIDAY,
24th, 25th, 26th, 27th, 28th MAY, 1948, at 11 a.m each day, the
GOVERNMENT SURPLUS PLANT, EQUIPMENT & STORES,
including:—

Large assortment of nuts, bolts, screws, washers, studs, unions, springs; large quantity of LIGHT TANK SPARE PARTS; Tool kits; 6,000 spanners. AIRCRAFT EQUIPMENT, including Turn Indicators, Rev counters, Altimeters, fuel gauges, oil thermometers, oil pressure gauges, temperature gauges, air speed indicators and electrical assembly cables. Transformers, Condensers, regulators; rectifiers, switch boxes, starters, Isolating switches and fuses. Electrical Test panels, Resistance Testers, Ammeters and Voltmeters. ELECTRIC MOTORS, ½ to 20hp; 80 2.75 K.V.A. 4-cyl. "Coventry Climax" Portable GENERATORS; 145 2.75 K.V.A. "Douglas" Portable GENERATORS, Pillinger and Stuart Portable Generators; Lister 75 K.W. Generator.

600 H.P. BLOWER RIG; DYNAMOMETER, Mk. VI, 3,000 B.H.P., with 75hp Electric motor; light alloy spot welding machine; welding and cutting plant; "Hewittic" Rectifier; "Magnaflux" crack detector; 3 grading machines; charging set; approx. 80,000 yds of ELECTRICAL WIRING and CABLE, quantity of dry batteries, portable wireless transmitters.

"Peter Brotherhood" and "Sentinel" steam-driven and other AIR COMPRESSORS; 2 Annealing machines; Degreasing plant; Paraffin clarifier; solvent refiner; Bagshaw Conveyor; Bucket conveyors; Deepwell Stationary Pump; Gas heated stove; Salt bath; Pot and Tempering Furnaces; Storage and Swilling Vats; Salt baths; lead lined and steel STORAGE TANKS; 80 Diesel OIL TANKS; 1,800 single and double line shafting PULLEYS; line shafting pedestals; 30 "Lister" Auto Trucks; wire ropes.

97 TORPEDO TRAINING CAMERAS; 730 BINOCULARS; approx. 600 yds of ¼in and ⅜in FELT; Army bedrolls; Haversacks; Anti-gas Clothing; Eyeshields; part-worn Boots and Shoes; metal FOOD CONTAINERS; Camp Kettles; field ovens; Butchers' blocks; fish friers and pans; knives, forks, spoons, mugs, dishes and plates; hurricane and hanging lamps; single and double CROSS-CUT SAWS, etc.

VIEW DAYS.—19th, 20th and 21st MAY, 1948, 9 a.m to 4 p.m. ADMISSION BY CATALOGUE ONLY.

CATALOGUES covering complete Sale, price 6d (Postal Orders only), admitting 2 persons on View Days and ONE person only on Sale Days, available from the AUCTIONEERS' OFFICES, 3, Magdala Buildings, Weston-super-Mare (Telephone 2451-2). [1719

CLUBS

WILTSHIRE FLYING CLUB.

£3 per hour, dual or solo, Magisters and Austers: A.B., instructor's licences and instrument flying, night flying £5/5 per hour; air charter, 5d per passenger mile (minimum two); residence 3½gns week; fully licensed restaurant and bar; booklet.—Thruxton Aerodrome, Andover, Hants. Weyhill 352. [0253

REDHILL FLYING CLUB, Redhill Aerodrome, Surrey, for instruction.—Nutfield Ridge 2245-3234 [0348

BREVET FLYING CLUB.—Fully licensed residential club house, excellent food, membership now exceeds 10,000; meet the flying types at the "Brevet"; membership, £1/1 p.a.—Secretary, 11, Chesterfield St., Mayfair, W.1. Gro. 1353. [0392

DENHAM AERO CLUB.—Fully licensed clubhouse, good food, beautiful swimming pool, 40 min. Paddington Stn.; flying rates from £2/15, dual £2 solo per hour; average dual to solo six hours; a/c, Piper Cubs, Auster, Proctor, Magister; fly yourself hire and charter.—Telfd. Denham 2161. [0409

COWES AERO CLUB.—Flying instructions at £3 per hour (dual and solo) for Moth and Auster aircraft, combine your flying instruction with a holiday by the sea, accommodation and all details arranged; attractive clubhouse offers full social amenities, short-term membership avialable.—Full details from Secretary, Cowes Airport, Isle of Wight. Tel. Cowes 535. [0004

HERTS and Essex Aero Club Broxbourne Aerodrome, Nazeing, Essex, 15 miles from centre of London, L.N.E.R. from Liverpool Street or Green Line Route 715 every 20 minutes from Broadcasting House; flying training in Tiger Moths, Hornet Moths, Austers and Magisters, dual £3/5, solo £3 per hour; instructor's courses, air charter and photography, residential clubhouse, restaurant; trial lesson, half an hour in the air with an instructor, 30/-.—Tel. Hoddesdon 2453. [0230

EXPERIMENTAL WORK

PROTOTYPES; specialists in experimental work, design and construction of special machinery and electro-mechanical mechanisms.—Research Engineers, Ltd., Northampton Grove, Canonbury, London, N.1. Canonbury 4244-5. [0384

HOTELS AND ACCOMMODATION

ROYAL OAK HOTEL, Keswick-on-Derwentwater, heart of English Lake District, offers restful holiday to Air Force personnel; first-class accommodation at reasonable charges. [0814

INSURANCE

AVIATION insurance, personal accident (flying) policies.—J. W. T. Amey, Messrs. R. J. Moffat & Co., 796, High Rd., Tottenham, N.17. Tottenham 2003-4-5. [0300

MISCELLANEOUS

NO coupon clothing

AND camping equipment.

AMAZING offer of brand new and reconditioned

EX-AMERICAN and British Government surplus stocks.

EX-R.A.F. waterproof flying suits, zip fitted throughout, complete with fur collar, 35/-; brand new, ex-American super warm, kapok filled, waterproof inner flying suit linings, 16/11; super quality mens Bedford cord, khaki riding breeches, double thickness leg strappings, reconditioned, up to 36 waist, 22/6; Womens velvet cord riding breeches, reconditioned, 21/-; ex-Government womens navy blue tailored slacks, 18/11; ex-American 1st grade boiler suits, heavy quality belted and large roomy pockets, 24/6; womens, 15/6; khaki bush shirts, up to 15½ neck, 9/11; reconditioned ex-R.A.F. shirts, 10/6; ex-R.A.F. helmets, 10/6; brand new ex-Govt. men's fawn heavy double texture macks with belt, deep storm collar, large roomy pockets, 75/-.

CASH with order, postage and packing 1/3 extra.

MARCUS STORES, Ltd., Gravesend, Kent. [0403

60 bench drilling machines, ⅜in and ½in motor driven, 3-phase, £19 each complete, to clear.—Victa Engineering Co., Maidenhead. [1743

EMBROIDERED badges and crests made to order.—Write Willeringhaus & Co., Ltd., 48, North Side, Streatham Common, London, S.W.16. [0379

HEAVY duty rectifier chargers, brand new, ex-Ministry, for 200-250 volt supply, output 36 volts 56 amps; £55.—Victa Engineering Co., Maidenhead. [1732

NEW Avondale Swan caravans, 16ft long, 2 doors, end kitchen, lantern roof, now on view at Caravania, Ltd., 200, Cricklewood Broadway, N.W.2. Gladstone 3434. [0207

LIGHTING and charging sets, 35 volt, 1,260 watts, 2½hp, complete, ready to run, £33; 12-32 volt sets, £18 to £27; particulars on request.—Victa Engineering Co., Maidenhead. [1672

R.A.F. officers' uniforms purchased; large selection of R.A.F. officers' kit for sale, new and reconditioned.—Fisher's, Service Outfitters, 86-88, Wellington St., Woolwich: Tel. Woolwich 1055. [1388

CARAVANS.—A first-class selection of new and second-hand caravans for permanent homes and holidays; super Winchester, 17ft. 6in., Craftsman 16ft., Thomson Kelvin, Rivers, Adams, Eccles, Pilot, Carlight, Ace, and numerous others; prices from £350-£1,600; easy terms; immediate delivery.—X.L. Caravans, Ltd., Blue Star Garage, Maidenhead. Tel Maidenhead 783. [0405

INDUSTRIAL buildings for sale, Thorns second-hand buildings require no purchase licence and are easily erected with a minimum of labour; Nissen type huts, Blister hangars, steel and asbestos buildings, etc., suitable for factories, workshops, offices, garages, stores, canteens, etc.; also new buildings.—Write to J. Thorn & Sons, Ltd., Box 151, Brampton Rd., Bexleyheath, Kent. Tel. Bexleyheath 305. [0816

A Caravan Death? Ex-editor caravan paper living in van 11 years with Britain's biggest selection indignantly denies he's gone to a better (or worse!) world in a motor accident. Come down to Taplow by train (Station 4 minutes) or London to Reading bus (B) passing door, and you'll see him tooling around his 75 vans; all guaranteed; open always; easiest terms.—A. S. Jenkinson, Bath Rd., Taplow, Bucks. Tel. Maidenhead 2610. Right on main A.4, Slough-Maidenhead section; Slough and London buses pass door; Paddington ½hr fast train. [0278

PACKING AND SHIPPING

R. & J. PARK, Ltd., 143-9, Fenchurch St., E.C.2. Tel. Mansion House 3085; official packers and shippers to the aircraft industry. [0012

PHOTOGRAPHY

AIRCRAFT photographs, 1/- for sample and list.—19, Voilet Gardens, Croydon. [1744

ADVERTISER wishes to contact photographer with experience of aerial photography and processing; must possess own facilities in North or West London area.—Box 7074. [1706

TIME RECORDERS

STAFF time checking and job costing time recorders (all makes) for quick cash sale; exceptional condition.—Box 3654. [0040

TIME recorders; service rental.—Tel. Hop. 2239. Time Recorder Supply & Maintenance Co., 157, 159, Borough High St., S.E.1. [1556

TUITION

AIRCREW COURSE?

B.A.N.C.S. of course.

THE British Aeronautical Navigational Correspondence School (B.A.N.C.S.) are specialists in aircrew licences postal courses, so write to the Secretary, 143a, High St., Hythe, Kent, for the School's free prospectus. [0336

PRIVATE tuition for pilot's licences and 2nd N. A few pupils taken for daily instruction by experienced ex-R.A.F. and civil instructor; London area; additional instruction given free to any pupil who fails to pass; terms 2½ guineas p.w.—Box 7203. [1736

PILOTS and navigators' ground training with the personal touch; excellent accommodation and recreational amenities; fees are low, but a pass is still guaranteed; flying training available in the near future.—Hastings School of Air Navigation, 4, Carlisle Parade, Hastings. [0406

MARSHALL'S FLYING SCHOOL trains pilots for A, B or Instructor's licences; dual and solo, **hourly rates, £3 for Tiger and Auster aircraft**; advanced training available on Proctor or Rapide aircraft; no entrance fees or annual subscription.—The Airport, Cambidge. Tel. 56291. [0245

7 long-nosed metal Viking aircraft FOR SALE

•

AIRWORK LIMITED

has concluded a selling arrangement with Aer Lingus whereby Airwork have selling rights for the disposal of 7 long-nosed metal "Viking" aircraft, until recently operated by Aer Lingus between London and Dublin. With the aircraft is a good supply of spares.

Enquiries to

15, CHESTERFIELD STREET, LONDON, W.1.

Telephone : • Grosvenor 4841

8/A11

LONDON SCHOOL OF AIR NAVIGATION

PROVIDES

W/T and R/T COURSES

in addition to -

POSTAL COURSES

AND

SPECIAL COACHING

FOR THE

NEW PILOT & NAVIGATOR LICENCES

Advice freely given on all aviation training problems

* * *

62 GREAT CUMBERLAND PLACE, LONDON, W.1.

Telephone : PADdington 4495/6

COTTON BAGS

FOR SPARE PARTS, Etc.

WALTER H. FELTHAM & SON, LTD.,

Imperial Works, Tower Bridge Road,

Telephone : HOP 1784. **London, S.E.1**

TUITION

AIR TUTORS, Ayr, Ayrshire.

COURSES at Prestwick Airport for the new pilots' and navigators' licences, also instrument rating. TWIN and multi-engined aircraft and link trainers, fully equipped for S.B.A., radio range, I.L.S., G.C.A. and radio compass.

AIR exercises carried out on the spot thus reducing flying time.

POSTAL courses for all licences, moderate fees.

GOOD accommodation available. [0356

MAINTENANCE engineers' licences.

BRITISH AVIATION SCHOOL announces the following:—

CATEGORY "A" Course covering Dakota airframe.

ALSO Dove and Bristol 170; including electrics, legislation and general inspection.

COMMENCING date May 17th; duration four weeks.

COURSE fee £15.

STUDENTS may join above course from May 24th to 28th for electrics and legislation only; fee £3/10.

FOR further details and future courses apply:—

CHIEF Instructor,

BRITISH AVIATION SCHOOL, Blackbushe Airport, nr. Camberley, Surrey. (Tel. Camberley 1600, ext. 32). [0332

STRAIGHT AVIATION TRAINING.

Special arrangements for candidates for First-Class Civil Air Navigator's licence. Central Navigation School, Bush House, accepts students weekly for theoretical and Link trainer courses. Flying training for pilots and navigators.—Enquiries Bush House, Temple Bar 2913. [0412

THE LONDON SCHOOL OF AIR NAVIGATION offers special coaching and postal tuition for the final 1st, Modified 1st, and 2nd Nav. examinations, also conversion courses for the new licences.

R/T LICENCE.—Course commences May 3rd.

62 GREAT Cumberland Place, London, W.1. Tel. Paddington 4495/6. [0277

AIRCRAFT or automobile engineering. Complete practical and technical training for entry to either industry.—Syllabus from Bursar, College of Automobile and Aeronautical Engineering, College House, Princes Way, Wimbledon, S.W.19. Put. 4107

ROCHESTER FLYING CLUB specialise in night flying at £4 per hour dual and £3/10 per hour solo in Tiger Moth aircraft, overnight accommodation always available, day rates are £3 dual and £2/15 solo per hour.—The Airport, Rochester. Tel. Bluebell Hill 212. [0395

THE EDUCO TECHNICAL SERVICE, BCM/EDUCO, London, W.C.1; individual postal tuition for Aircraft Engineer Licence examinations also general aeronautical engineering, metallurgy, aero-engine inspection and allied subjects; write stating requirements. [1666

WIRELESS telegraphy.—Short courses for P.M.G. Certificate of Civil Aircraft. Full courses for marine certificate for youth 16 upwards; plenty of vacancies in both services for numbers in training.—Particulars from London Telegraph Training College, Ltd., 20, Pionywern Rd., Earls Court, S.W.5 (Tel. Flaxman 8721), Est. 1896. [0299

WIRELESS Telegraphy.—Postal Course for P.M.G. Certificate for Civil Aircraft, short course of instruction at School, including R/T for Pilot Officers; also special coaching in Morse for Radio Officers for proposed new certificate.—Apply British School of Telegraphy, Ltd., 179, Clapham Road, London, S.W.9. Tel. Brixton 3487. [0218

AIRCREWS.—B.A.N.C.S. provide concise single lessons at 6/6 (ideal for all conversion courses) complete with illustrations test paper and tutorial advice to the 1948 I.C.A.O. Navigator's and Transport Pilot's Licence standards; Supplementary Syllabus from Secretary, British Aeronautical Navigational Correspondence School, 143a, High St., Hythe, Kent. [0335

BRITAIN'S AIR UNIVERSITY.—Courses for navigators. Assembly dates: 2nd Class Aircraft Navigators', May 10th; Flight Navigators', May 10th, June 1st; Conversion to Full 1st Class Navigators' from Modified 1st Class, June 7th. Special courses in specific subjects to suit individual requirements and convenience. Tuition is also available in schools of flying, radio and radar, aircraft and radio engineering.—Full details of all Courses from the Commandant, Air Service Training, Hamble, Southampton. Tel. Hamble 2185. [0327

SITUATIONS VACANT

Vacancies advertised are restricted to persons or employments excepted from the provisions of the Control of Engagement Order, 1947.

THE College of Aeronautics.

LECTURER in Electronics.

APPLICATIONS are invited for the post of lecturer in electronics.

THE syllabus to be covered consists mainly of the elements of the subject, with some advanced teaching for specialist students, and the principles of airborne radio and radar equipments. Previous experience of such equipments, and centimetre wave techniques, is desirable but not essential. There is good opportunity for research into the application of electronic techniques to aeronautical problems. Salary, plus superannuation under the Federated Superannuation System for Universities, according to qualifications and experience.

APPLICATIONS, giving full details of qualifications and experence, should be marked "Lecturer in **Electronics**" and sent to the Registrar, The College of Aeronautics, Cranfield, Bletchley, Bucks, from whom further information may be obtained. [1734

ROLLASON'S of CROYDON

(W. A. ROLLASON LIMITED)

CROYDON AIRPORT. Tel. CRO 5151/2.
(also at Southampton Airport. Tel. Eastleigh 87236/7; and Terminal House, Victoria, London, S.W.1. Tel. SLO 0611/20.

CHARTER AIRCRAFT :—RAPIDES, fitted Gipsy Queen III engines, very low engine and airframe hours, completely overhauled with 12 months C. of A. **STANDARD STR 16/17** Radio fitted, cabin furnishings and colour scheme to suit purchaser. Several for early delivery.

ANSONS, fully converted and modified to date, luxurious cabin furnishings, luggage compt., etc., fitted Radio-Payload 1,700 lbs., for immediate delivery.

CONSULS, PROCTORS, TIGER MOTHS, MOTH MINORS, GEMINIS, AUSTERS, SEABEES, etc., for immediate delivery at competitive prices.
ENGINES :—Large quantity of Gipsy VI, Queens & Majors, Cheetah IX & X ready for immediate installation.
RADIOS :—MARCONI and **STANDARD RADIOS** in stock, very early delivery of new **STR 16/17** Radio modified to fit Rapides. Special terms to operating Companies.

SITUATIONS VACANT

FOREMAN.

1. —Engine foreman.
2. —Airframe foreman.
3. —Electrical foreman.

REQUIRED to develop and run relevant division of overhaul and repair factory. Must hold D. B or X licence respectively, have wide and up-to-date experience and be capable of training Egyptian staff. In the case of (1) and (2) must be prepared to take such extensions to their licences as may be necessary. SALARY (1) and (2) up to £1,550.

(3) up to £1,480.—Write Box 7192. [1731

PLANNING engineer.

WILL be required to set up planning department covering overhaul and repair of aircraft, engines, instrument and electrical overhaul, will also be required to supervise drawing office. Must have had 10 years' general engineering experience, of which 6 years should have been in the aircraft industry. In addition must have had experience in a responsible position as a planning engineer. Should have held G.E.s licences or other qualification. Inclusive salary in the region of £1,500.—Write Box 7189. [1728A

WORKS superintendent.

REQUIRED to take full responsibility under technical manager for the running of the following divisions of an aircraft repair and overhaul factory: (a) airframe, (b) engine, (c) instruments, (d) electrical equipment.

AN energetic, practical man is required who must have had wide experience in aircraft repair and overhaul. Professional qualifications or a minimum of 2 M licences are essential. Top age limit 40. Capable of co-operating with Egyptian personnel. Salary inclusive £1,700 region.—Write Box 7191. [1730

(1) Engine; (2) airframe inspectors.

WILL be responsible to the Chief Inspector for Inspection Control in their respective divisions. Must have D and B licences respectively, be prepared to take such extensions as may be necessary, and have considerable experience on inspectional duties. Be prepared to work with and train Egyptian staff. Licences should cover (1) Hercules, Pratt & Whitney or Gypsy Queen 70 Series; (2) Dakota, Dove or Rapide. Salary up to £1,550.—Write Box 7190. [1729

AN important new aircraft overhaul organisation being established in Cairo has the following staff vacancies :—

SUPPLIES superintendent

WILL be required to set up a supplies organisation to cover (i) buying (ii) storage (iii) dispatch for a factory engaged in complete overhaul of aircraft and engines of British and American manufacture. Must have wide experience of aircraft stores procedure, and up-to-date knowledge of aviation markets generally. Must be prepared to work with, and train, Egyptian staff. Inclusive salary in the region of £1,600 according to qualifications.—Write to Box 7188. [1728

SAUNDERS ROE Limited, have vacancies for senior design draughtsmen, stressmen and aerodynamicists. Applications stating age, qualifications, experience and salary expected should be sent to Personnel Officer, Saunders-Roe, Limited, East Cowes, Isle of Wight. [0394

SITUATIONS VACANT

CIVIL AVIATION BRANCH,

AIR DEPARTMENT, New Zealand.

APPLICATIONS are invited for the following vacancies with the Air Department, New Zealand Government :—

(A) Aeronautical Engineer (Aerodynamics and structures), Wellington. Salary £875/£1,025 (NZ) p.a. depending upon experience and ability. Applicants should be 38 to 48 years of age and hold an engineering degree and/or A.F.R.Ae.S.

(B) Aeronautical Engineer (Power units, propellers and accessories), Wellington. Salary £875/£1,025 (N.Z.) p.a. depending upon experience and ability. Applicants should be 38 to 48 years of age and hold an engineering degree and/or A.F.R.Ae.S.

(C) Aircraft Surveyors (2 vacancies).

SALARY £560/685 (N.Z.) p.a. Applicants should not be over 38 years of age and should hold "B," "D," "X" maintenance engineer's licences or equivalent qualifications.

ALLOWANCE will be made for fares and expenses.

FURTHER details and general conditions referring to these appointments may be obtained by application to the High Commissioner for New Zealand, 415, Strand, London, W.C.2, with whom applications close on the 21st May 1948. [1725

THE De Havilland Aircraft Co., Ltd.,

HAVE a few vacancies for men with aircraft design experience.

DESIGNERS capable of controlling design of major component structures.

DETAIL designers, mechanical and structures.

ELECTRICAL installation designers.

APPLICATIONS stating experience, age and salary required, to be marked "Aircraft" and addressed to Chief Draughtsman, The de Havilland Aircraft Co., Ltd., Hatfield, Herts. [1701

BODY makers, coach joiners, screen fitters, required immediately by

JAMES YOUNG, Ltd., Rolls-Royce and Bentley coachbuilders, London Rd., Bromley, Kent. Tel. Ravensbourne 3434. [0322

STRESSMEN required.—Apply, stating qualifications, experience and age, to Personnel Officer, Westland Aircraft, Ltd., Yeovil. [1644

COMMERCIAL manager required by air charter company, salary commensurate with age and experience.—Particulars in writing to Box 7185. [1716

GROUND Engineer required with A, B, C and X licences for Auster and Tiger Moth; when applying give full details of experience and salary required.

AIRCRAFT (HEREFORD), Ltd., Newmarket St., Hereford. [1739

RADIO/NAVIGATOR required for private company, world operation Lockheed aircraft, American equipment.—Write, with full experience, to Box 7184. [1715

SENIOR stressman required.—Please send details of training, experience and salary required to Chief Technician, Gloster Aircraft Co., Ltd., Witcombe, Glos. [0369

DRAUGHTSMAN, senior, experienced aircraft design, also general engineering an advantage, Higher National Cert., good salary, 5-day week.—Apply Personnel Manager, Lockheed, Leamington Spa. [1660

SITUATIONS VACANT

DAKOTA captains required with previous civil aviation experience, must possess "B" and 2nd "N" licences, age approximately 30 years preferred.—Apply Box 7186. [1717

SHORT BROTHERS & HARLAND, Ltd., have vacancies for Stressmen and Aircraft Weight Estimators, preferably with experience, in their technical department.

APPLICATIONS should be sent to the Chief Personnel Officer, Short Brothers & Harland, Ltd., Seaplane Works, Rochester. [1653

INSPECTOR (Working Foreman) for N.W. London, with broad experience in manufacture of detail parts and assembly of mechanical components to A.I.D. standards.—Write fully giving experience, age, and salary required to Box No. 7205. [1740

THE DE HAVILLAND ENGINE Co., Ltd., require design and detail draughtsmen, preferably with experience in gas turbine and/or reciprocating engines. —Apply Personnel Office, De Havilland Engine Co., Ltd., Stag Lane, Edgware, Middx. [0409

NAVIGATION instructor required for reserve flying school in Scotland, must be up to 2nd N. standard, R.A.F. Warrant acceptable conditionally.—Address applications, marked "Navigation," Airwork, Ltd., 134, Bath Rd., Hounslow, Middlesex. [1688

JIG and tool draughtsmen; senior jig and tool draughtsmen with sheet metal, planning and tooling experience, and two experienced jig and tool draughtsmen required.—Apply Personnel Office, The De Havilland Engine Co., Ltd., Stag Lane, Edgware, Middx. [0404

BRISTOL AEROPLANE Co., Ltd., have a few vacancies for competent loftsmen and one experienced linesman in their fullscale layout department. Aircraft D.O. experience essential.—Apply giving full dtails of qualifications and experience to Administration Engineer, Aircraft Design Drawing Office, Filton. [1735

APPLICATIONS are invited from technicians, stressmen and aerodynamicists of degree standard, and design-draughtsmen with previous aircraft experience, for a few vacancies on the technical staff of Handley Page, Ltd. Extensive and interesting development programme in hand, offering good opportunities and prospects to candidates with initiative and enthusiasm.

APPLICATIONS, giving age, qualifications, experience and salary required should be addressed to Staff Officer, Handley Page, Ltd., Claremont Rd., Cricklewood, N.W.2. [1663

SITUATIONS WANTED

EX-F/O, air traffic control officer, area control and master airfield experience, seeks situation anywhere.—Box 7063. [1698

PILOT, B licence, 2nd N., instructor's licence, 1,800 hrs., airline experience, above average assessments, available immediately, willing to go abroad. —Box 7027. [1677

THE Guild have fully qualified licensed pilots, navigators and instructors available for employment at short notice, also members experienced in aviation who are suitable for administrative appointments.—Londonderry House, 19, Park Lane, W.1. (Gro. 1212.) [0367

FLIGHT engineer (27), ex-R.A.F., 1,100 hrs, "O" licensed for Yorks, experienced Libs., Lancs., Privateer, Hudson, Dakota, Skymaster; also flying boats, Sunderland, Catalina, Grumman; wide route and test experience; requires position, home or abroad.—Box 7187. [1720

WANTED

A.P. 1732A wanted immediately; write stating price to Box 7231. [1741

Brand New K20

FOLMER-GRAFLEX

Hand-Held, Manually-Operated

AIR CAMERA 5" × 4"

FEATURES :

6½ in. Kodak or Ilex. f 4.5 anastigmat.
Iris Diaphragm. f 4.5 to f 22.
Variable Speed Shutter, 1 125 to 1 500.
Vacuum Pressure Plate (Synchronised).
Automatic Film-wind and Set Shutter.
50 EXP. DAYLIGHT LOADING FILM.
Data Recording on Negative.
Large Optical Parallax Finder.
Finger Grip Release.
and many other features. Supplied complete in fitted fibre case with red & yellow filters, accessories and manual. Price £20. (Cost £90). (Used model £15).
IDEAL FOR AIR OR SPORTS USE
(Govt. Surplus)

F. E. JONES 3 BREEZE HILL LIVERPOOL, 9 Tel.: AINTREE 1129

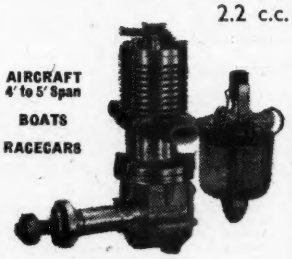
FILM FOR ALL PURCHASERS

LOOK!

2.2 c.c.

The MAJESCO 2 2 DIESEL

AIRCRAFT 4' to 5' Span
BOATS
RACECARS



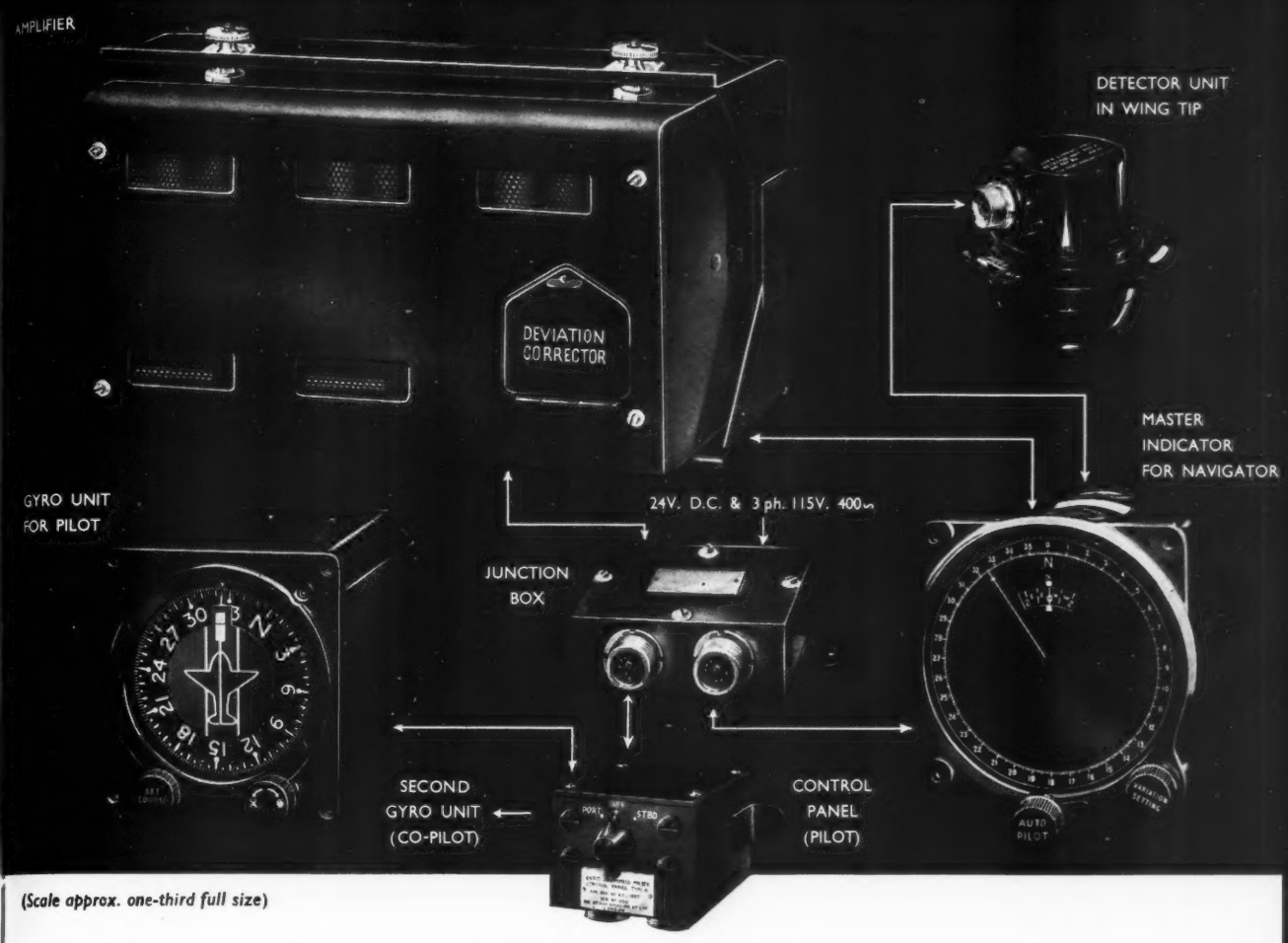
ONLY

£4-12-6

CASTINGS AND DRAWINGS 21/6

MAJESCO MINIATURE MOTORS LTD.,
VALE ROAD, PARKSTONE, DORSET.

Printed in Great Britain for the Proprietors, FLIGHT PUBLISHING COMPANY LIMITED, Dorset House, Stamford Street, London, S.E.1, by THE CORNWALL PRESS LTD., 1-6, Paris Garden, London, S.E.1.
"Flight" can be obtained abroad from the following: AUSTRALIA and NEW ZEALAND: Gordon & Gotch Ltd. INDIA: A. H. Wheeler & Co. CANADA: Imperial News Co., Gordon & Gotch, Ltd. SOUTH AFRICA: Central News Agency, Ltd., Wm. Dawson & Sons (S.A.), Ltd. UNITED STATES: The International News Co. Entered as Second Class at the New York, U.S.A., Post Office.



(Scale approx. one-third full size)

SPERRY GYROSYN *G. IV B.*

The Gyro - Magnetic Compass Mk. IV. B (Gyrosyn type IV. B) represents the very latest practice in aircraft compasses. It has been designed to meet the full requirements of pilot and navigator for a compass capable of providing all data necessary for precise aircraft navigation.

- Pilot's Gyro Unit, monitored to give accurate dead-beat indication of aircraft's heading at all times.

- Navigator's Master Unit, with large - size scale and 1° markings to enable very accurate readings to be taken. This unit permits the navigator to set local variation (up to 180° E. or W.) so that all indicators, repeaters and monitored systems indicate "true" heading.

- Power Repeater System for monitoring in azimuth ancillary equipment such as Air Position Indicator, Radio Compass, etc.

- Incorporates separate azimuth monitoring for Mk. IX (S.E.P. 1) Autopilot, complete with navigator's control.

- All deviation corrections (A, B and C) carried out at Master Unit and Amplifier.

- Sperry Flux Valve (Detector Unit) proved over many thousands of hours of flight operation In both Civil and Military aircraft. There is no magnetic needle, thus eliminating pivot friction and northerly turning errors.

G.IV.F Compass

The Gyrosyn type IV.F is the latest design for smaller aircraft not requiring power repeaters. It consists of three units only—Detector Unit, Gyro Unit and Amplifier. A control panel can also be fitted if required.

SPERRY

FLIGHT

APRIL 22ND, 1948

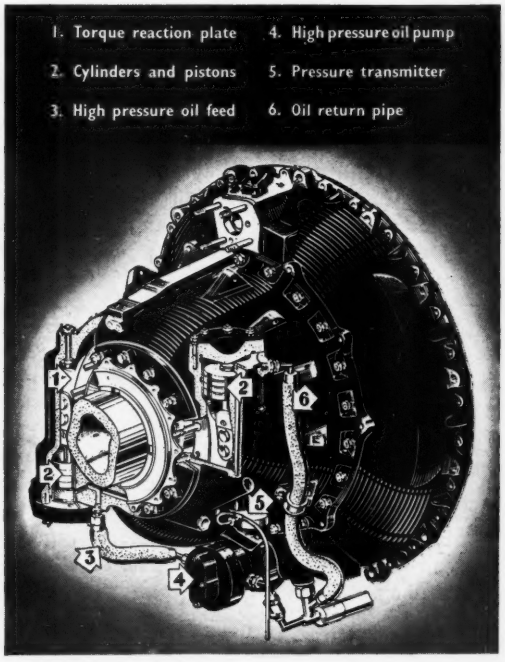
SAFETY . . . and consistent fuel consumption

Safety on ocean flights demands reliable fuel consumptions. Bristol Sleeve Valve Engines give a triple safeguard:

● The fuel injection system is not affected by icing or changes in airflow pattern and there are no air metering passages to get obstructed. The normal fuel filter is supplemented by a special felt filter which normally remains untouched between engine overhauls and protects the fuel metering device from dirt in the fuel.

● Due to the excellent mixture distribution, the Bristol engines operate satisfactorily on a very lean mixture and will work over a relatively wide range of mixture strengths with little change in specific fuel consumption. The fuel air ratio is, therefore, not critical and small errors can be tolerated.

● Since there are no poppet valves to deteriorate or get out of adjustment, loss of engine performance is not likely but if any occurs it is shown immediately on the torquemeter, which is an optional feature on all current Bristol engines. The torquemeter, in conjunction with a fuel flowmeter, will give an immediate indication of excessive fuel consumption.


1. Torque reaction plate
2. Cylinders and pistons
3. High pressure oil feed
4. High pressure oil pump
5. Pressure transmitter
6. Oil return pipe

THE BRISTOL AEROPLANE COMPANY LIMITED · ENGLAND